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AN ACTION PROGRAM FOR CLEAN WATER

SOUTH CAROLINA POLLUTION CONTROL AUTHORITY
COLUMBIA

PREPARED FOR
FEDERAL WATER POLLUTION CONTROL ADMINISTRATION
CHARLOTTESVILLE, VIRGINIA

1969

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"We can no longer trust to luck in maintaining
the quality of water in our streams."

The Honorable Robert B. McMillan
Governor of South Carolina

September 1963

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***AN ACTION PROGRAM
FOR
CLEAN WATER***

**Joint Study and Proposals
by
South Carolina Pollution Control Authority*
and
Federal Water Pollution Control Administration,
Middle Atlantic Region**

**Compiled and edited by: Phillip L. Tate, FWPCA, MAR
James M. Hudgens, SCPCA**

* South Carolina Pollution Authority as used herein does not include the Division of Air Pollution and Radiological Health of the Bureau of Sanitary Engineering.

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FOREWORD

The State of South Carolina is undergoing a shift from an agrarian to an industrialized economy. Where the agrarian economy results in a disseminated population, the industrial economy results in highly concentrated population centers. These population concentrations result in great quantities of highly concentrated municipal wastes entering the streams at a point location as opposed to scattered, non-concentrated effluents of an agrarian society. The industrialized economy also provides leisure time to its employees resulting in greater demands for water-based recreation. Some chemical components of industrial wastes are considerably more difficult to deal with than agricultural and low-density municipal wastes.

The South Carolina Pollution Control Authority has been aware of this qualitative shift and has requested the Middle Atlantic Region of the Federal Water Pollution Control Administration to aid in a study aimed at delineating a program to protect and enhance water quality throughout the State. The study was conducted jointly by the Pollution Control Authority of South Carolina and the

Middle Atlantic Region of FWPCA. This arrangement permits this report to incorporate the wide experience of the members of the State Authority and the perspective of the Regional Office of FWPCA.

The purpose of this study is to evaluate the State's program for water pollution control and to suggest ways to more closely gear the Pollution Control Authority's programs to modern problems and solutions. The study consisted of a review of the State pollution control law; an analysis of water pollution problems; delineation of current efforts to control water pollution; delineation of a "basic program"; a workload analysis relating predicted pollution control needs to the "basic program"; and, finally, the identification of the program and personnel resources needed to achieve and maintain adequate water pollution control. The latter was based on specific program goals for clean water throughout the State by 1975, and formulation of dynamic basin plans for meeting future water pollution control needs without significant interference with the State's economic growth.

INTRODUCTION





INTRODUCTION

The South Carolina Pollution Control Authority, since its creation, has been charged with the responsibility for abating, controlling, and preventing water pollution in the State. Efforts to control water pollution in South Carolina accelerated with the passing of the Pollution Control Law in 1950. The Authority has been generally successful in fulfilling its responsibility. It is imperative that the Authority improve and revise its pollution control operations so as to cope with water pollution problems characteristic of urbanized states.

In recent years, the directorate of the Authority has become increasingly aware of growing problems, a shift in public sentiment supporting a clean environment, and the changing pollution conditions caused by accelerating industrial and population growth. Late in 1968, the Authority, with an awareness of public opinion and the demands of pollution control, had undertaken a self-appraisal. Concurrently, the FWPCA had as part of its responsibility, been making an evaluation of the agency effort and pollution problems being encountered. The two agencies working jointly have performed an initial evaluation to define the Authority's problems and develop a program which will meet future needs. The goals outlining the program are encompassed in a five-year period and are the framework for future planning.

The State's program for future water quality management as recommended herein assures that water of adequate quality will be available for future South Carolinians for all legitimate uses. Advances in pollution control technology are such that this "protection" need not be at the expense of urban or industrial growth.

The State's industrial and municipal leaders must, however, recognize how their demands influence quality and must be prepared to cooperate fully with the State agencies to assure that water shall continue to be one of the State's most cherished assets.

Appreciation is expressed to the following organizations and individuals for helpful contributions in the compilation of this report:

South Carolina Electric and Gas Company
Duke Power Company
Federal Power Commission

Corps of Engineers

South Carolina Soil and Water Conservation Committee

South Carolina State Development Board

South Carolina Water Resources Commission

South Carolina Public Service Authority (Santee-Cooper)

South Carolina State Board of Health
South Carolina Department of Parks, Recreation & Tourism

South Carolina Department of Wildlife Resources

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Mr. Alan Levin, FWPCA Headquarters

Mrs. Barbara B. Ashley, FWPCA, MAR
Secretarial Staffs of FWPCA, MAR
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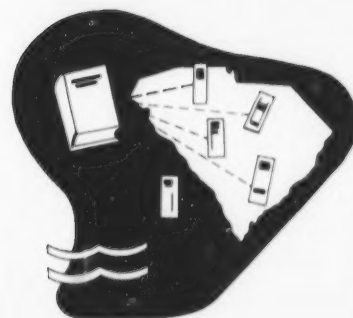
And special acknowledgment to Mrs. Susan H. Houchens, FWPCA, MAR for her dedicated performance in the production of this report.



COLUMBIA
Capitol of
SOUTH CAROLINA



***SUMMARY, CONCLUSIONS AND
RECOMMENDATIONS***



SUMMARY

The State Pollution Control Authority was created by, and operates under, an Act of the General Assembly of 1950. This legislation was apparently well suited to the problems of the time, and provided an effective base for the establishment of a viable water pollution control program. The State's pollution control activities are carried out by the State Pollution Control Authority within the State Board of Health. State activities are supplemented by several Federal pollution control programs, notably those of the Department of the Interior (FWPCA), the Department of Housing and Urban Development, and the Department of Commerce. A State Water Resources Commission has also been established.

The State is currently experiencing a massive economic shift with a substantial industrial base being superimposed upon the existing agricultural economy. This transition is accompanied by a continuing population growth; a rural to urban population shift; a decline in agricultural employment without a reduction in agricultural production; increasing use of chemicals and machines in agriculture; and the construction of many new industrial facilities.

The effects of these changes, expressed in terms of water quality, include an increase in the total volumes of waste; increases in the complexity of wastes; increases in volumes at specific discharge locations; and greater power demands with their concomitant thermal effects.

Although water resources of the State are substantial, including rivers, reservoirs, and the coastal area, they are not unlimited. Avoidance of a loss of water resources will therefore require constant improvement in waste treatment facilities and practices. In turn, increasing demands

will be exerted upon the State's Pollution Control Authority—demands which cannot be met with existing resources or facilities.

CONCLUSIONS

1. The State has extensive water resources which, if properly protected, will sustain all foreseeable economic and population expansion.
2. Clean water is essential to the future economy and growth of the State.
3. Existing waste treatment technology is now such that water quality can be maintained and enhanced without interference with the State's economic potential.
4. Effective administration of the State's Clean Water Program requires that the Authority have adequate laboratory facilities and that staff be increased from the present authorized level of 37 to a minimum of 110. These resources would permit the Authority to improve present programs and to:
 - design and establish an automatic data processing capability
 - expand and refine the State's water quality monitoring and surveillance network
 - develop long-range water pollution control plans for each major basin, including the coastal zone
 - require operating permits for all communities and waste producing industries
 - provide routine inspection of waste treatment facilities during construction
 - initiate programs for the routine inspection of waste treatment facilities
 - undertake field studies of specific pollution problems and, where necessary, support abatement actions

through the courts

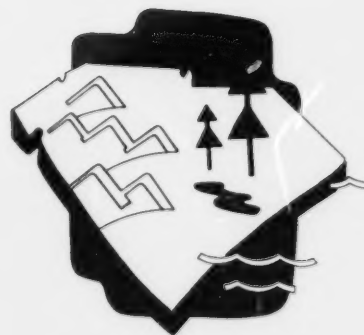
- provide adequate laboratory support
 - provide adequate management and administrative services.
5. The 1950 water pollution control legislation and the 1969 amendments may not provide an entirely adequate base for all future water pollution control programs.
 6. Highly specialized and trained personnel are required for the conduct of an effective water pollution control program. Current personnel practices have made it difficult for the Authority to recruit and retain pollution control specialists.
 7. There is no program for State financial assistance for the construction or operation of waste treatment facilities. The absence of such a program decreases the degree of Federal participation for individual communities and may increase the difficulty for some community financing of waste treatment facilities.

RECOMMENDATIONS

It is recommended that:

1. The State Pollution Control Authority be substantially expanded, and that the present system of regional laboratories be strengthened.
2. The Authority be given a greater degree of autonomy in its personnel recruitment and management practices.
3. Existing legislative authority be reviewed to provide assurance that the Authority has the statutory base needed to meet foreseeable water pollution control problems.
4. The State review its position with respect to the provision of financial assistance to communities and industries for construction, maintenance, and operation of waste treatment facilities.

DESCRIPTION



PHYSIOGRAPHY

South Carolina has two distinct geographic regions—the Atlantic Coastal Plain in the east and the Appalachian Highlands in the west. These two regions are separated by an old coastline, now called the fall line, which roughly bisects the State along a diagonal between the North Carolina boundary in Chesterfield County and the Georgia boundary in Aiken County. They are commonly known as the up-country and the low-country, and differ in custom, history, and livelihood. The State may, however, be divided into three physiographic divisions or soil provinces. They are the Eastern or Coastal Plain province, Central or Piedmont Plateau province, and the Western or Blue Ridge Mountain province.

The State as a whole has an annual mean temperature of about 63° with normal seasonal variations. Summers are long and warm but not enervating. Nights are cool in the up-country and heat in the coastal areas is tempered by breezes from the ocean. The lowest annual mean temperature in the State is at Caesars Head in Greenville County—54.9°; the highest in Beaufort—67.3°. Rainfall is abundant, averaging 48 inches and evenly distributed throughout the year. Growing seasons range from 199 days in the Piedmont area to 257 days along the southern coast.

HYDROGRAPHY

South Carolina is drained by three main river systems—the Pee Dee in the northeast, the Santee in the central area, and the Savannah in the south and west. Lakes and reservoirs cover less than four percent of the land surface.

Yadkin-Pee Dee Basin

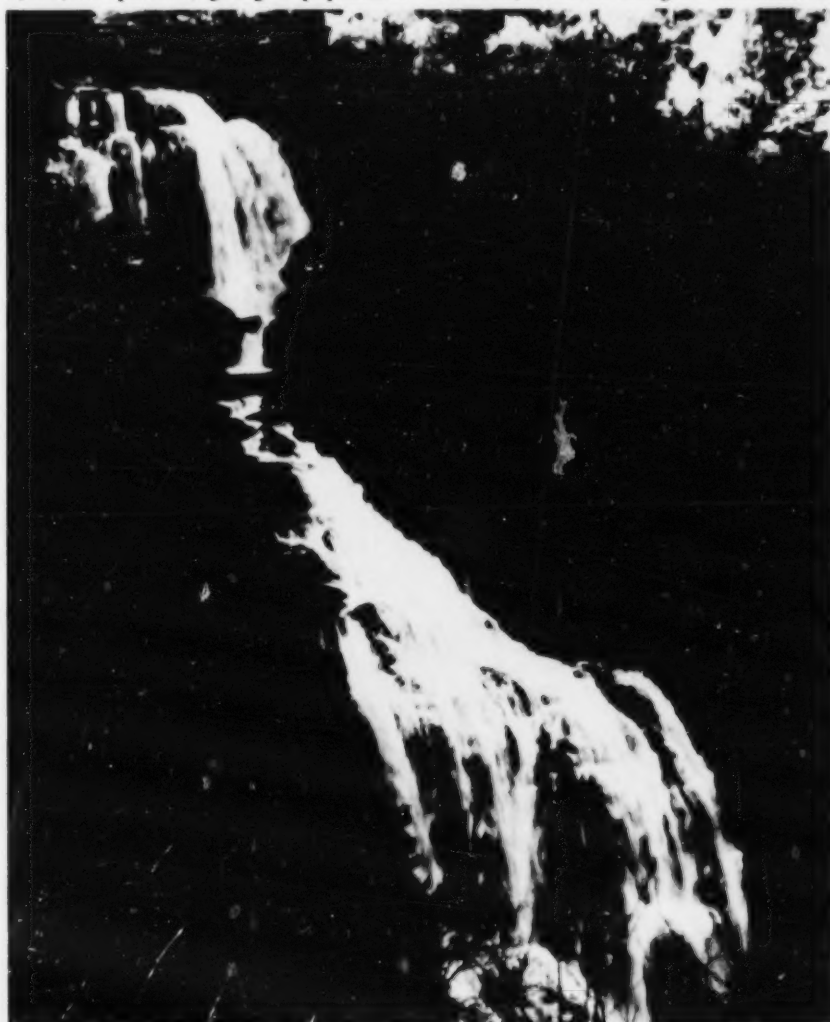
The Yadkin-Pee Dee River is an interstate stream rising in North Carolina and flowing through Virginia, North Carolina, and South Carolina to the Atlantic Ocean. It has a drainage area of approximately 1,500 square miles. The river rises on the eastern slopes of the Blue Ridge Mountains and discharges into the Atlantic Ocean near Georgetown, South Carolina. At this point, the Pee Dee joins the Waccamaw and Black to form Winyah Bay. The portion of the stream above the mouth of the Uwharrie River is known as the Yadkin River and that portion below the mouth of the Uwharrie is known as the Pee Dee River. The length of the Yadkin-Pee Dee River Basin measured in its general direction is approximately 250 miles. The Basin is bounded on the north by the New and

Roanoke River Basins, on the east by the Cape Fear River Basin, and on the west by the Catawba and Broad River Basins. Headwater tributaries of the Yadkin River are at elevations ranging from 2,500 to 4,000 feet. The Yadkin-Pee Dee River consists of a continuous chain of power reservoirs from the South Carolina State line upstream to the South Yadkin River.

Total population of the Yadkin-Pee Dee Basin as of the 1960 census was 1,250,000 persons, giving a population

age basin lies in the Piedmont Region of North Carolina and South Carolina with a portion in the coastal plains of South Carolina. Drainage area is 3,253 square miles in North Carolina and 4,400 square miles in South Carolina, not including the Cooper River Basin or about 7,850 square miles drainage area of the Broad River Basin.

The Catawba-Santee is known as the Catawba River in North Carolina. In South Carolina, the name changes to the Wateree



density of 830 persons per square mile. The major city is Winston-Salem, North Carolina, having a population of approximately 112,000. The major water-using and waste-producing industries in the area include textile, pulp and paper, tobacco, and poultry processing.

Catawba-Santee Basin

The headwaters of the Catawba-Santee River are located on the eastern slope of the Blue Ridge Mountains in western North Carolina. Most of the river's drain-

River at the mouth of the Big Wateree Creek near Great Falls, South Carolina. The Wateree River then flows south about 91 miles to join with the Congaree River to form Lake Marion and the Santee River.

Lake Marion on the Santee River, and Lake Moultrie on the headwaters of the Cooper River, are connected by a water level canal. The impoundment control facility at Lake Marion releases a minimum flow of 500 cubic feet per second to the

Santee River. The remaining flow is diverted to Lake Moultrie and the Cooper River which flows to the Atlantic Ocean by way of Charleston Harbor. This diversion is used for power production at Lake Moultrie Dam near Moncks Corner, South Carolina, and for industrial water supply. A provision is also made for navigation of barges and recreation craft through the Cooper River by way of the lake system.

The population of the Catawba-Santee Basin in 1960 was a little over a million; 600,000 in North Carolina and 450,000 in South Carolina, giving a population density of 145 persons per square mile.

There are a total of 18 hydroelectric plants in North Carolina and nine hydroelectric plants in South Carolina.

The Catawba River at Catawba, South Carolina, has a drainage area of 3,530 square miles. Flow is highly variable due to impoundments at power plants. Average flow during the driest year (one in twenty) is about 2,200 cubic feet per second; minimum daily flow is 600 to 800 cubic feet per second. The Broad River rises in the mountains of southwestern North Carolina and flows southeasterly entering South Carolina near Gaffney. The river then flows southerly to the vicinity of Columbia, South Caro-

Broad River prior to entering South Carolina. The Pacolet rises in Henderson, North Carolina, and flows through Polk County entering South Carolina near Landrum. From Landrum, the river flows southeasterly to the Broad River. The Saluda River rises in Pickens and Greenville Counties, South Carolina, and flows southerly and easterly converging with the Broad River at Columbia to form the Congaree.

This basin also contains a population of a little over a million, with about two-thirds located in the metropolitan areas of Greenville-Spartanburg, and Columbia, South Carolina. The population



The two largest cities in the basin are Charlotte, North Carolina, with a 1965 population of 244,000; and Charleston, South Carolina, with a 1965 metropolitan population of 186,000.

The major industries of the basin include textiles, pulp and paper, and chemicals. Most of these industries are located on the Catawba River in the vicinity of Charlotte, North Carolina, and extend southward to the Wateree Pond on the Wateree River. There are a number of reservoirs in the basin utilized for power production and regulation of river flow.

lina, where it is joined by the Saluda River to become the Congaree for the next 50 miles down the stream. The river drains approximately 7,850 square miles, of which about 1,503 square miles lie in North Carolina and 6,347 square miles lie in South Carolina.

The principal tributaries to the Broad River are the First Broad, Second Broad, Pacolet, Tiger, and Enoree Rivers. The Pacolet is the only one of the principal tributaries that is an interstate stream. The First and Second Broad Rivers lie wholly in North Carolina and join the

throughout the basin provided for population density of 133 persons per square mile.

Industry is found throughout the basin; however, the two major areas of industrial concentration are the Greenville-Spartanburg and Columbia metropolitan area. The major industries include textiles, paper, plastics, and food processing.

The Broad River above Columbia has an average flow of 6,106 cubic feet per second. There are numerous run-of-the-river type power plant reservoirs and a few large reservoirs located on tributaries.

Savannah Basin

The southernmost river in South Carolina, the Savannah, serves as the boundary between South Carolina and Georgia along with the Chatooga and the Tugaloo Rivers. The Savannah begins at Hartwell Reservoir, at the confluence of the Seneca and Tugaloo Rivers. The upper basin of the Savannah is essentially mountainous, rolling terrain; the lower portion of the river flows through swampy, low-lying areas. The river system supports two impoundments—Hartwell Reservoir and Clark Hill Reservoir. These have greatly reduced the probabilities of low flow in the Savannah River. The minimum observed daily flow has not been less than 7,700 cubic feet per second as measured at Cleo, Georgia, or 6,120 cubic feet per second as measured at Augusta, Georgia.

The lower 28 miles of the Savannah River are tidal. A major section, below Augusta, encompassing some 20 miles, is closed for water use due to security regulations of the Atomic Energy Commission Savannah River Plant.

The basin population in 1965 was approximately 1,017,000, and the major communities are Augusta, Georgia, with a population of 67,000; and Savannah, Georgia, with a population of 141,000. The population is expected to increase to 1,151,000 by 1975, an average annual increase of 1.25 percent. The Georgia portion of the estimated 1975 population is estimated to be 817,000, and the South Carolina portion of the population is estimated to be 334,000.

Coastal Zone

The last three important rivers are the Edisto, Combahee, and Black; all three are independent of the three main systems included in the Pee Dee, Santee, and Savannah Rivers.

The estuarine and coastal areas of South Carolina include all or portions of the following counties: Beaufort, Berkeley, Charleston, Colleton, Georgetown, Horry and Jasper. The length of the tide-water shoreline including the main and islands, and embracing all the indentations that fringe the coast has been estimated at 5,000 miles, and there are 425,000 acres of salt marsh. Total water area of these tidelands is 201 square miles. A border of sandy barrier islands extends from Georgetown to Savannah, more than two-thirds of the coast line.

Inland Lakes & Reservoirs

The State has no important natural inland lakes; however, over a period of 52 years, eight major impoundments have been constructed:

Lake Murray

Lake Murray, located in the central part of the State about 15 miles northwest of Columbia, is on the Saluda River. The impoundment encompasses parts of Richland, Lexington, Saluda, and Newberry Counties. The lake, designed and built as a hydroelectric power generation facility in 1927, is owned by the South Carolina Electric and Gas Company. It has a power generating capacity of 404,000 kilowatts. The impoundment area of 50,000 acres and a shoreline of 500 miles afford a wide range of recreational opportunities and development potential.

Lake Greenwood

Lake Greenwood is located in the western part of the State, about 20 miles above the headwaters of Lake Murray on the Saluda River. The impoundment encompasses parts of Newberry, Greenwood, and Laurens Counties. The lake, known also as Buzzard's Roost, was designed and started as a hydroelectric power generation facility in 1938 and finished in late 1940. The facility has a power generating capacity of 15,000 kilowatts and also serves as a water supply for the City of Greenwood. All types of recreational facilities are supported by the 11,450 acres of the impoundment and the 212 miles of shorelines.

Clark Hill Reservoir

Clark Hill Reservoir is located on the Savannah River approximately 30 miles above Augusta, Georgia. The impoundment is a multi-purpose facility built by the Corps of Engineers for a hydroelectric power generation, flood control, and navigation control project. Construction was begun in 1946, and the impoundment was completed in 1955. The hydroelectric generating capacity is 280,000 kilowatts. The shoreline of 1,200 miles encompasses an impoundment of 70,000 acres of which 21,323 lie in South Carolina in portions of McCormick and Abbeville Counties.

Hartwell Reservoir

Hartwell Reservoir is located on the Savannah River, 98 miles above Augusta, Georgia, and 67 miles above the Clark Hill impoundment. Hartwell was also built by the Corps of Engineers as a multi-purpose facility, primarily for power production. Construction was started in 1955 and terminated in 1963. The 962 mile shoreline encompasses an area of 61,350 acres, of which 37,300 lie in South Carolina, covering parts of Anderson, Oconee,

and Pickens Counties. The power generation capability is 264,000 kilowatts and the lake has become a recreation center for the Georgia-South Carolina area.

Lake Wiley

Lake Wiley, also known as Catawba Lake, is located on the Catawba-Wateree River in the northern part of the State, and lies in the States of South Carolina and North Carolina. The impoundment was built and is owned and operated by the Duke Power Company as a hydroelectric generating facility. The hydroelectric generating capacity is 60,000 kilowatts. Construction was begun in 1924 and finished in 1926. The shoreline of 327 miles, of which 167 miles is in South Carolina, encompasses an area of 12,455 acres. The impoundment is used for all types of recreation and serves as a water supply for Belmont, Charlotte, and Mount Holly, North Carolina.

Wateree Pond

Wateree Pond is located in the north central part of the State on the Wateree River between Camden and Great Falls, South Carolina. It serves as a water supply source for the town of Great Falls and supports all types of recreation. The hydroelectric generating capacity of the facility is 56,000 kilowatts. Construction was begun in 1917 and completed in 1920, and the shoreline of 190 miles encompasses an area of 13,710 acres.

Lake Marion^{1/}

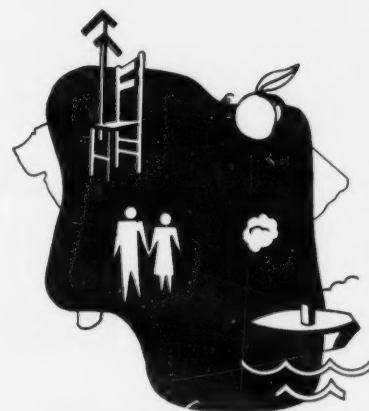
Lake Marion is located in the eastern part of the State on the Santee River, in an area known as the English Santee. It encompasses parts of Sumter, Calhoun, Clarendon, and Orangeburg Counties. The facility was built by the State of South Carolina through its Santee Public Service Authority. The impoundment encompasses 110,600 acres and supports a hydroelectric generating capability of 2,500 kilowatts.

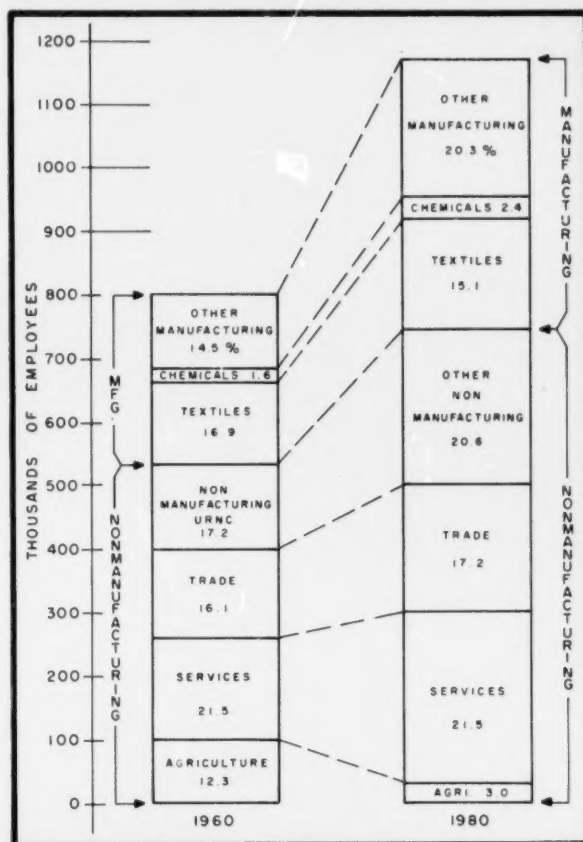
Lake Moultrie^{1/}

Lake Moultrie is located in headwaters of the Cooper River in Berkeley County. With a shoreline of 450 miles it encompasses an area of 60,400 acres. It was built and operated by the State of South Carolina through the Santee Public Service Authority. The hydroelectric generating capacity is 13,000 kilowatts.

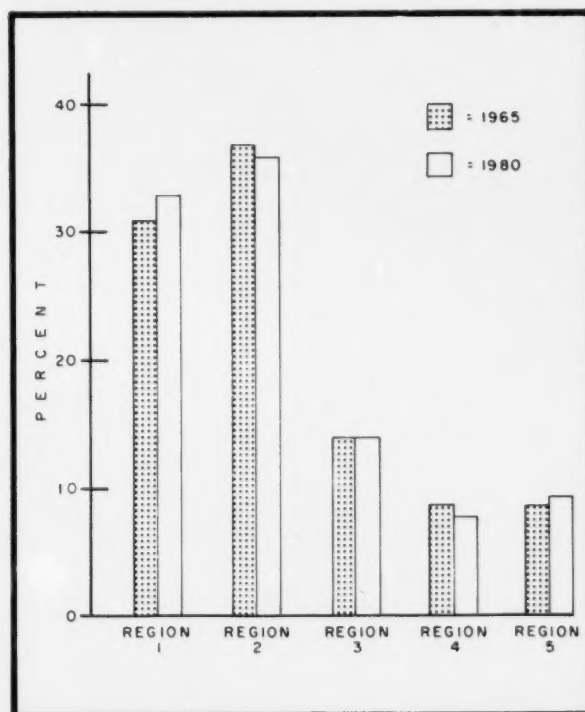
^{1/} Lake Moultrie and Lake Marion are connected by a man made canal, 7½ miles long.

ECONOMY AND POPULATION





LEVELS OF AND DISTRIBUTION OF STATE CIVILIAN EMPLOYMENT, 1960 AND 1980



DISTRIBUTION OF SOUTH CAROLINA POPULATION BY REGION FOR 1965 AND 1980

ECONOMY AND POPULATION

During the 1950's, South Carolina ranked 25th among the States in growth and employment and 5th among the southeastern States. By 1967, South Carolina ranked 26th in population. One of the reasons for the relatively poor employment growth record was the tremendous drag on the economy of the agricultural sector. Whereas agricultural employment decreased about 40 percent nationally, it dropped more than 50 percent in South Carolina. The losses were more pronounced in South Carolina because of the large percentage of the labor force within agriculture.

Growth in the non-agricultural sector has been impressive and has served to draw manpower away from under utilization in agriculture and into more economically productive jobs within manufacturing, services, and trade. In addition, agriculture became more diversified and production became oriented toward a variety of important cash-yielding products such as soybeans, fruits, nuts, vegetables, livestock, poultry, and dairy products.

The State's percentage of the labor force in manufacturing now exceeds that of the Nation. However, much of the employment is in industries whose employment trend at the national level is either in slow growth or in decline. These include food, textiles, apparel, lumber and furniture. However, the growth forecast for food, textiles, and apparel is favorable for South Carolina.

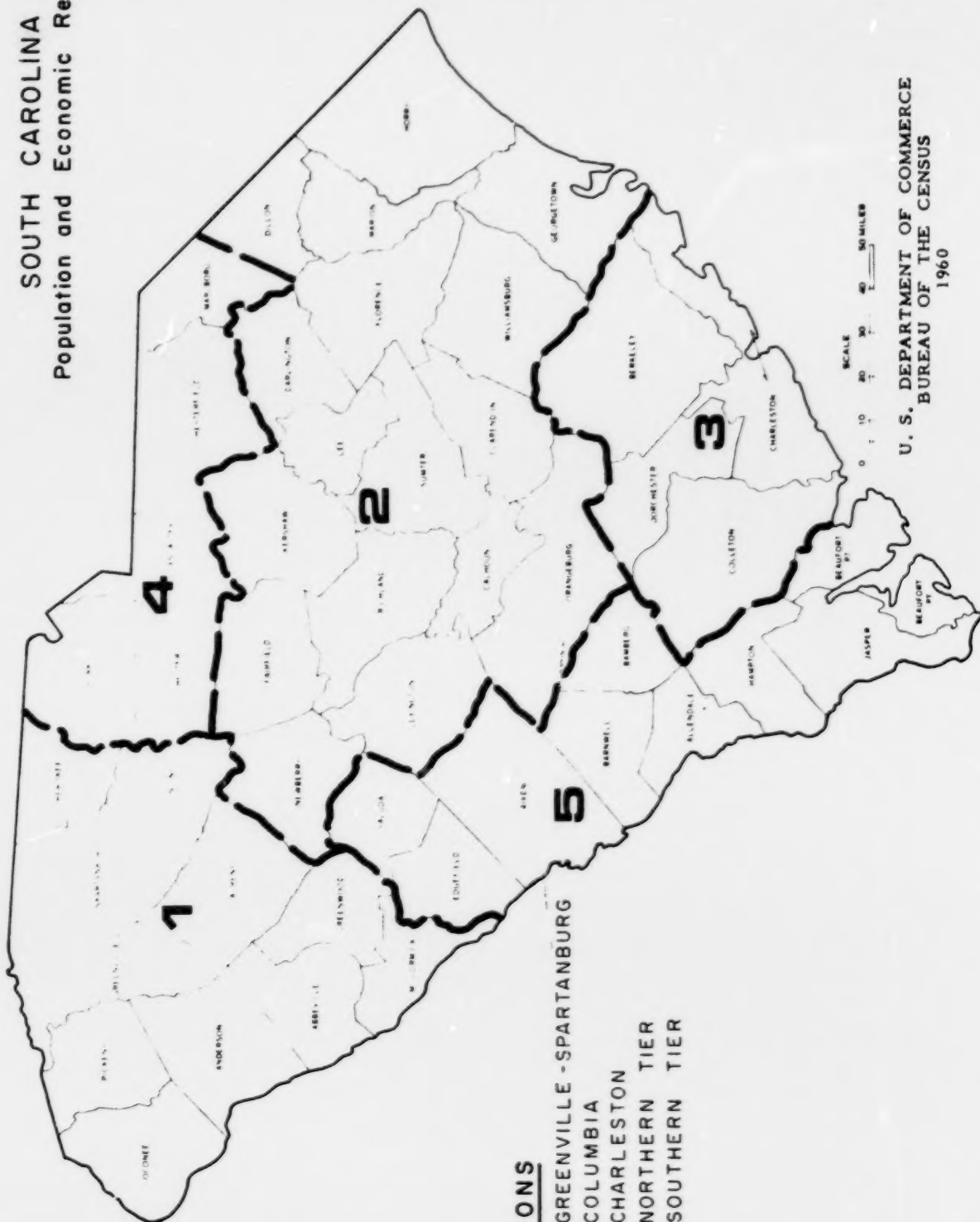
South Carolina has had relatively low employment in the nationally important transportation equipment, electrical equipment and non-electrical machinery industries. This has changed rapidly in recent years and continued phenomenal growth is projected for these industries in South Carolina. Rapid expansion is also foreseen in chemicals, fabricated metals, paper and allied products, and the non-manufacturing sectors of trade, services, and civilian government.

Water recreation is expected to increase significantly for the many freshwater lakes and accessible coast lines, both of which are becoming increasingly popular with travelers and tourists. It is estimated that South Carolina's potential vacation market is 53,000,000 people. Planned resource development should enable the State to convert its wealth of water resources into a principle destination area for many of the 20,000,000 visitors projected by 1974.

Region I

This 11-county region is the most densely populated area in the State. In 1965,

SOUTH CAROLINA Population and Economic Regions



U. S. DEPARTMENT OF COMMERCE
BUREAU OF THE CENSUS
1960

- REGIONS**
- 1. GREENVILLE-SPARTANBURG
 - 2. COLUMBIA
 - 3. CHARLESTON
 - 4. NORTHERN TIER
 - 5. SOUTHERN TIER

about 33 percent of South Carolina's population resided there. The region is highly industrialized and more than 50 percent of the State's total manufacturing employment originates in its factories and mills. About one out of every two jobs is in manufacturing.

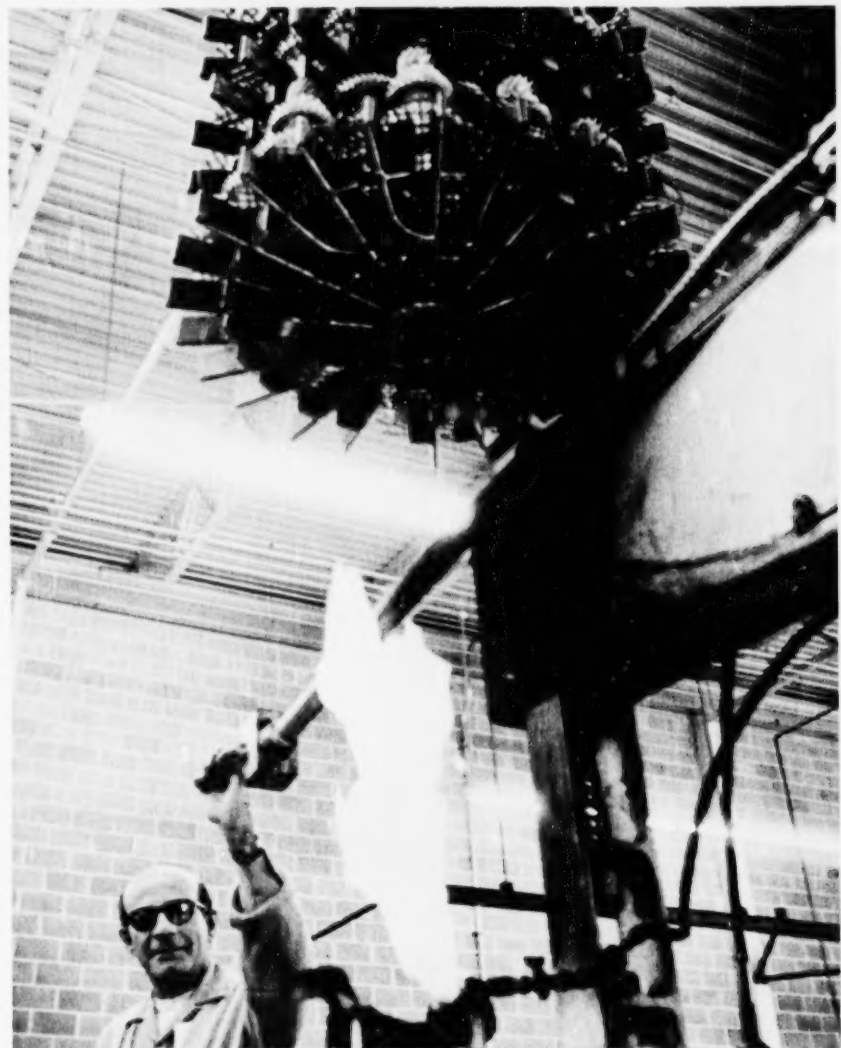
Although manufacturing employment will expand less rapidly than within the other regions of the State, this region will continue to provide more manufacturing jobs per person. Textiles, which accounted for more than 60 percent of the total manufacturing employment in 1965, will continue to grow moderately from its estimated level of 90,000 in 1967 to about 100,000 in 1980. Expansion of the production of synthetic fibers should lead to increased job opportunities in the chemicals sector. The manufacture of apparel, which represented about 13 percent of manufacturing employment in 1960, should more than double its employment by 1980. Continued vigorous growth is foreseen for employment in electrical and non-electrical machinery, fabricated metals, and paper products; the greatest absolute job gains will be in non-electrical machinery with a projected increase of about 6,000 jobs between 1967 and 1980.

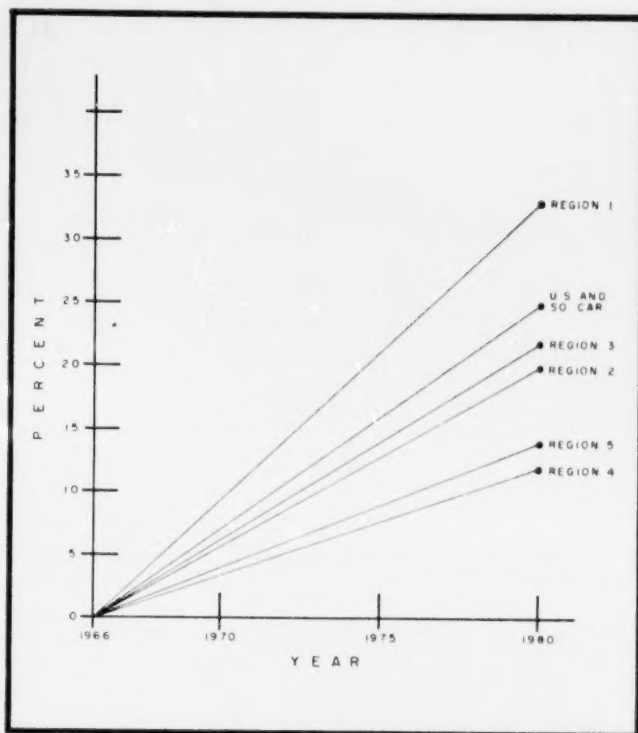
Population and industrial growth is expected to be concentrated adjacent to Interstate 85 which provides access to Charlotte, High Point, and Greensboro, North Carolina, and Atlanta, Georgia. Development of a megopolitan corridor running from Anderson, South Carolina, northeast into the Charlotte-Gastonia, North Carolina, area is forecast. The Greenville-Spartanburg area is developing a highly diversified industrial base. It will become increasingly important as a financial service and trade center.

Region II

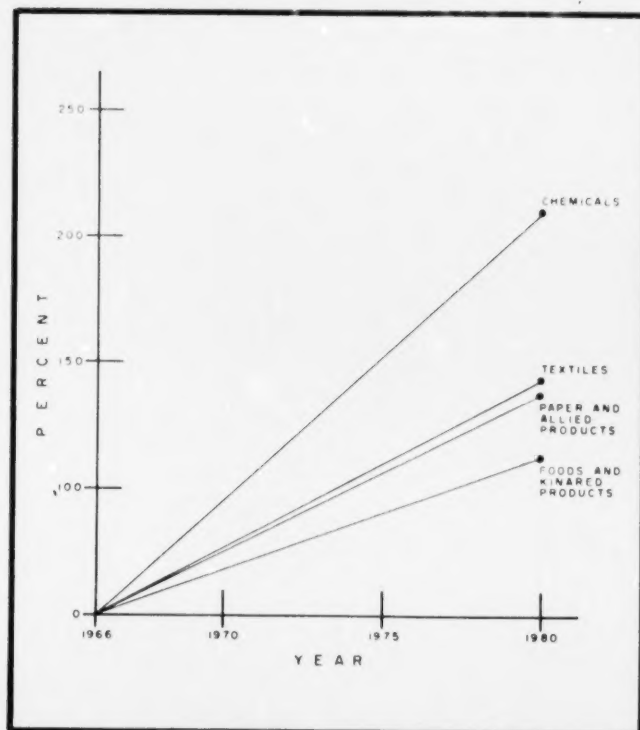
The percentage of total employment originating in the manufacturing sector is relatively low within this area, only about 18 percent in 1960. Five industries account for over 75 percent of total manufacturing employment; textiles, lumber and furniture, apparel, food products, and paper products.

The region experienced very little growth during the 1950's. Agricultural employment declined precipitously, while the non-agricultural sector experienced only moderate gains. There was a great influx of Federal military personnel which had a palliative effect on the economy. In spite of concern by State leaders that significant gains in manufacturing would only occur in the Piedmont area of the State, Florence and Orangeburg have re-





PROJECTED POPULATION CHANGE, 1966-1980



PROJECTIONS OF OUTPUT FOR IMPORTANT WATER USING INDUSTRIES IN SOUTH CAROLINA FROM 1966 TO 1980 (IN PERCENT)

cently experienced spectacular industrial growth both in terms of employment and value added. Vigorous industrial growth is projected both for the region as a whole and for the Florence and Orangeburg areas.

Textile employment is expected to expand moderately and since it now represents such a large share of total employment, it will continue to be important to the region's economy.

Among the region's rapid growth industries are non-electrical machinery, fabricated metals, apparel, synthetic fibers and chemicals, paper and allied products and food processing. The production of durables is expected to increase in the Orangeburg-Florence area. Richland and Lexington Counties should become increasingly more important as trade and service centers. State and local government employment should increase relatively swiftly in Columbia and the rapidly urbanizing surrounding area.

Region III

Manufacturing accounts for about 25 percent of employment in this area. Transportation equipment, lumber and allied products, apparel and paper account for more than 70 percent of total manufacturing employment. Transportation equipment, which accounts for about 35 of the 70 percent, is of importance in the area because of the ship and boat building and repair shops, as well as aircraft works.

The projected rapid growth industries are ordinance and fabricated metals, apparel, paper products, chemicals, and transportation equipment. Employment in the government sector is relatively high, primarily because of military personnel stationed in the Charleston area.

A major industrial attraction is the large deep channel port located on the Ashley-Cooper Bay at Charleston. It ranks 13 in the Nation based on the volume of foreign trade handled. Much of the trade is high-value general cargo. One source has estimated that one-third of the new industry which has located in South Carolina since World War II can be traced to the reactivation of the State ports. It can be expected that the services of the port will continue to expand and to attract additional industry.

Charleston County is one of the best developed tourist areas in the State and it now receives \$1.00 out of every \$8.00 spent by tourists in the State. Charleston beaches, i.e. Isle of Palms, Sullivan's Island, and Folly, primarily serve the local population. Of the three, Isle of Palms has a potential for development as a tour-

ist center. With proper planning and promotion it might serve to attract additional tourist dollars to the economy.

Region IV

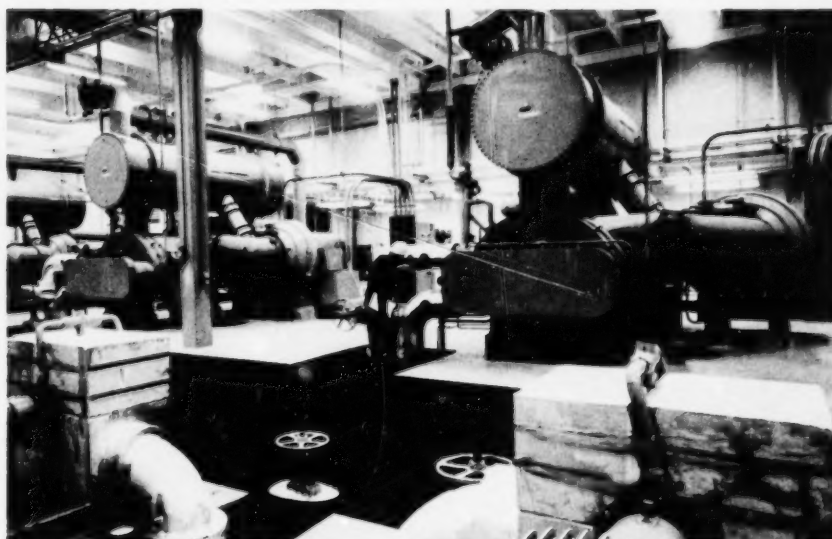
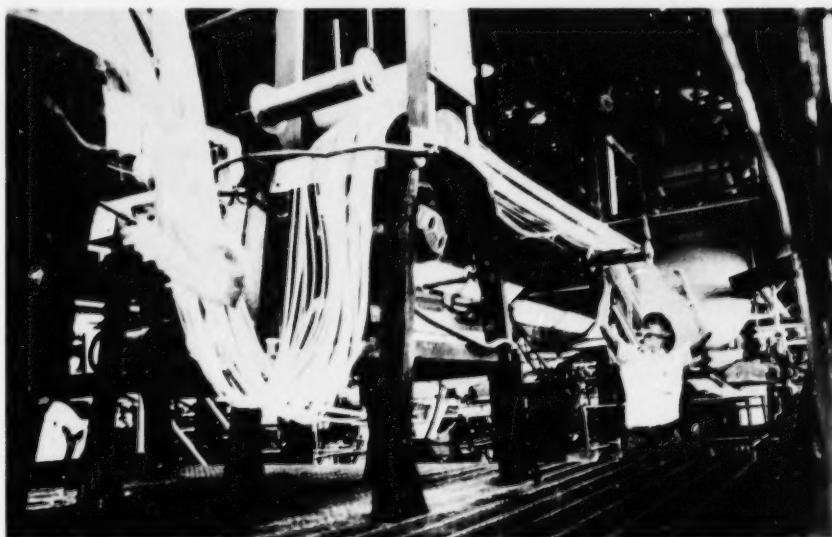
Very little growth is projected for this region as a whole. However, rapid expansion is forecast for textiles and synthetic fibers along the reaches of the Catawba River and the York and Lancaster areas. Significant increases are foreseen for employment in food and paper products industries.

Region V

Lumber, furniture, and wood products are important in the Beaufort, Hampton, and Jasper area, while textiles, apparel, and lumber and wood products are important in the other counties.

Rapid growth is expected for Aiken County which is closely associated in its development with the growth of the Augusta, Georgia area. Chemicals and food products should experience employment growth with expansion in the services and trade sectors also being forecast to be of significant dimension.

Tourism and water recreation are important income producers in Beaufort County beach areas. There is a deep water harbor port at Port Royal which is primarily used for shipments of clay.



**Total Population and Population within Water Service
Areas for the State and Selected Growth Counties 1960
and Projections for 1980**

	1960	1980
Lexington Population:		
Total	60,726	132,400
Within Water Service Areas	26,900	96,000
Richland Population:		
Total	200,100	310,200
Within Water Service Areas	150,000	279,000
Greenville Population:		
Total	209,800	333,000
Within Water Service Areas	198,000	300,000
Spartanburg Population:		
Total	156,800	253,100
Within Water Service Areas	91,100	227,000
Charleston Population:		
Total	216,400	331,000
Within Water Service Areas	160,000	300,000
York Population:		
Total	78,800	113,000
Within Water Service Areas	42,000	90,400
Aiken Population:		
Total	81,000	113,600
Within Water Service Areas	44,000	71,000
Anderson Population:		
Total	98,500	155,000
Within Water Service Areas	44,500	82,800
Florence Population:		
Total	84,400	96,900
Within Water Service Areas	36,000	53,000
Sumter Population:		
Total	74,900	97,700
Within Water Service Areas	30,200	50,000
State Population:		
Total	2,382,600	3,173,500
Within Water Service Areas	1,335,000	2,000,000

WATER USES





WATER USES

Municipal/Industrial Water Supply

There are approximately 450 water supply systems in the State of South Carolina including municipal systems, district systems, community systems, industrial systems serving residences, industrial systems which serve sanitary facilities for employees, and subdivision systems. These cities and industries together with the unincorporated communities of the State have a withdrawal capacity of approximately 480,000,000 gallons of water per day from ground and surface sources.

Surface water is the main source supplying municipal and industrial water requirements in the State; over 65 percent of the municipal population is served by surface water only, another 30 percent is served by ground water only, and the remainder served by a combination of surface and ground water. Municipalities and communities withdraw approximately 225,000,000 gallons of water per day from both surface and ground sources and have a capability of withdrawing 340,000,000 gallons of water per day. Of an estimated State population of 2,700,000, nearly 60 percent utilize municipal water supply systems.

Manufacturing industries withdraw approximately 315,000,000 gallons of water per day exclusive of cooling water from both surface and ground sources with chemical and textile industries accounting for more than 50 percent of the withdrawal. Most significant industrial users have developed adequate independent surface water supplies. About 60 percent of the fresh water intake comes from company surface water systems, with better than 30 percent being drawn from public water systems.

Eighty percent of the total gallonage withdrawn by manufacturing firms is discharged to surface water bodies. The demand for municipal and industrial waters in the State is expected to be 665 mgd by 1975, 760 mgd by 1980, and 1,330 mgd by the year 2000. Municipal and industrial demands are expected to remain relatively equal in proportion during this period. Water supply needs for the State are becoming increasingly concentrated. At the present, the majority of the municipal and industrial requirements occur in the five major municipal areas; and the percentage is expected to increase steadily as the agrarian economy gives way to industrial economy and urban growth.

Recreation

The waters of the State support a variety of types of recreation. Sport fishing is the acknowledged pastime of the South Carolinian. South Carolina waters are teeming with fish, the year-round climate is excellent, and practically every accommodation the fisherman might desire is generally available. South Carolina has an abundance of public waters ranging from trout in the lower end of the Appalachian Range to numerous reservoirs, streams, and ponds in the central and lower half of the State, to pier, surf and deep sea fishing off the coast (see Page 36). Some 250 miles of public trout fishing streams are in the northwest corner of the State. Thousands of catchable size fish are stocked each year.

The eight major reservoirs, 400,000 acres, provide extensive freshwater angling opportunities from the Piedmont to the Coastal Plain. These reservoirs provide large-mouth bass, blue-gill, catfish, cráppie, pickerel, and landlock-striped bass in plentiful numbers. Large-mouth bass and blue-gill furnish excellent fishing in most of the 25,000 farm ponds in South Carolina. Hundreds of miles of "black water" streams throughout the low country offer a unique type of fishing in a beautiful setting. These fertile streams meander through the coastal plain with giant moss covered cypress trees shading the way to the sea.

Over 250 species of saltwater fish are found along the South Carolina coast and in estuarine areas. Whether from pier, surf, small boat or deepwater boat, the saltwater fisherman can practice his hobby in South Carolina.

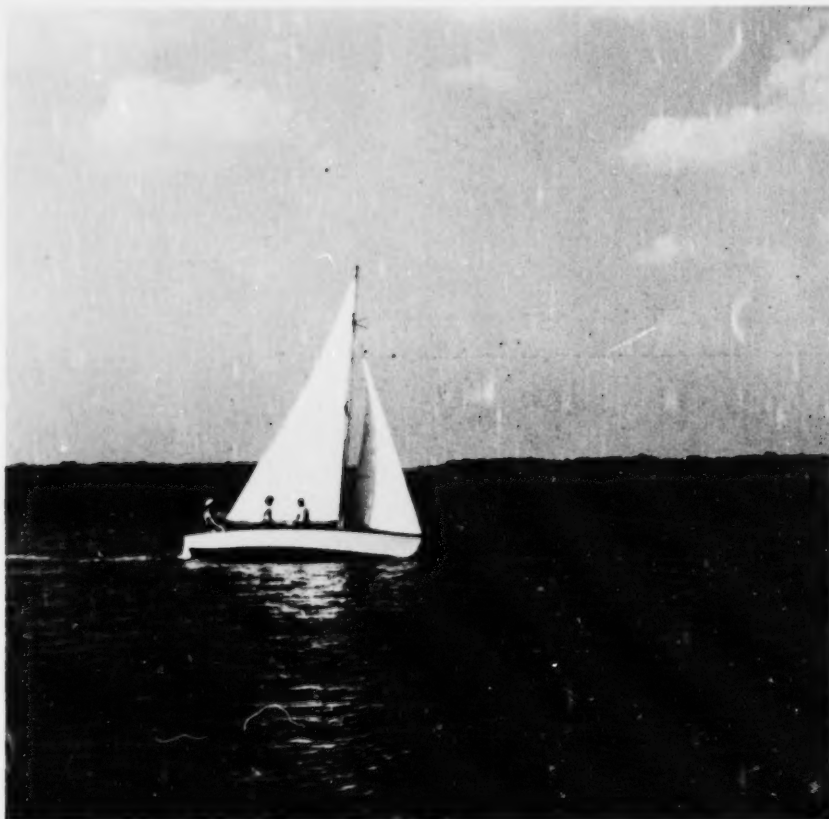
According to the national survey carried out by the Outdoor Recreation Resource Review Commission, water is the focal point for a large share of recreational activity. High levels of participation are experienced by activities directly associated with water, such as swimming, fishing, and boating. This survey also reports that most people prefer to drive, camp, walk and picnic in water recreation areas.

There are 65,570 boats registered in the State. This figure does not include watercraft which are not required by law to be registered.

Based upon a recent State report² it was estimated that 15 million persons visited South Carolina in 1966 spending over \$175 million in the State. It was



²Economics Research Associates. "A Preliminary Study of Tourist Recreational Potentials in South Carolina," September 1, 1967.



further estimated that this amount would increase to over \$200 million by 1974. The report indicated that an appreciable number of these visitors were there for water oriented activities. Water oriented recreation activities contribute substantially both directly and indirectly to the economy of the State. These activities are totally dependent upon water quality.

Agriculture

Irrigation is not widely or consistently used because of generally adequate average rainfall. Under existing conditions, these withdrawals are not of significance except in restricted areas or during extreme drought conditions. There is little return flow from spray irrigation as practiced in South Carolina.

Navigation

South Carolina has 240 miles of a navigable Intracoastal Waterway. This system serves as a major north-south artery. The migration of pleasure craft through the Waterway is a major use.

The prospect of navigation from Charleston to Columbia on the Santee and Congaree Rivers is being investigated in a two-phase study by the Water Resources Commission. At the request of Governor McNair, the Commission is coordinating a study which will lead to a clear definition of South Carolina's policy position on the matter of navigation on the rivers.

Wildlife

All wildlife is dependent upon water for existence. Three geographic regions, the mountainous northwest, the rolling hills of the Piedmont, and the Coastal Plain which includes the flat lands, great swamps, wide marshes, barrier islands, and beautiful beaches boast an abundance of wildlife well distributed over all three regions. The larger species of animals are most abundant in the coastal counties.

Quail are found in all sections, the best hunting being generally in the central and lower parts of the State. Deer are plentiful in the lower sections and restocking is being carried on successfully in some sections in the up-State regions. Rabbit, squirrel, coon, possum, fox, mink, otter, muskrat, wildcat, and a few bear remain generally distributed throughout the State.

Waterfowl are plentiful on the coastal reaches and along the river swamps as well as the several State and Federal refuges. The refuges attract many ducks and geese and marsh hens.

The coastal waters abound with many game fish, such as tarpon and sailfish. The commercial fishing industry which harvests shrimp, oyster, crab, clam and

finfish contribute millions of dollars to the economy of the State.

Trout are found mainly in the mountain counties of the northwest but are not in plentiful supply. Other species of game fish are numerous and abundant (see Page 34). The reservoirs, rivers, and private ponds support a long list of fish and other wildlife.

Aside from game birds such as geese, ducks, and marsh hens few States have as rich an abundance and variety of bird life as South Carolina where more than 450 kinds of birds can be found.

Electric Power Generation

While electric power production does not cause an appreciable depletion of the resource, it does have an effect on water quality in terms of temperature and dissolved oxygen. Impounding and releasing the water for the operation of turbines to meet integrated power production schedules may cause significant fluctuations in stream flows. In some cases, zero flows may result from hydro-power production schedules.

The waters of the State now support a hydroelectric generating capacity of 935,035 kilowatts. An additional 820,000 kilowatt capacity is under construction. Steam power generation affects water quality in terms of dissolved oxygen saturation in that water is used not as a primary energy source but as a coolant. There is an existing production capacity of 2,148,970 kilowatts, 1,045,600 kilowatt capacity under construction, and 315,000 kilowatt capacity planned. Nuclear power production will utilize the State waters much the same as steam power generation in that water is used as the coolant. The State's first nuclear fueled power plants are now under construction, a 3,355,000 kilowatt facility near Salem and a 944,584 kilowatt facility near Hartsville.

Aesthetics

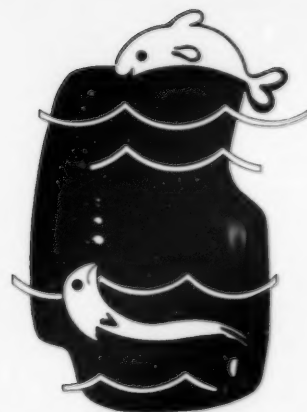
South Carolina was born of the sea and has historically been in great measure dependent upon productivity associated with water. In like manner, the South Carolinian enjoys those activities associated with water. It would be unnatural for people to seek out foul and unattractive areas to visit or to reside in. No finer demonstration of the importance of the aesthetic quality of water can be found than that of the use of the State's water. Intensity of water base recreation, increasing prevalence of stream side residence and the rapid growth of the stream bank areas all testify to the growing appreciation of the importance of waters' presence



to the social well-being of the State's habitants. The nature of the physical environment is recognized locally as well

as nationally to be important in terms of community feeling, productivity, and personal satisfaction.

WATER QUALITY PROBLEMS





RIVER BASINS

Pee Dee River Basin

Based on the most recent information, there are over 30 oxidation ponds capable of treating 3,946,000 gpd of sanitary wastes; 16 treatment facilities other than oxidation ponds capable of treating 5,610,000 gpd of sanitary wastes; and 23 treatment facilities capable of treating 44,941,000 gpd of industrial wastes. A total of 21,350,000 gpd* is withdrawn from the Pee Dee and/or its tributaries for municipal and industrial uses, and a total of 54,497,000 gpd of wastes which have received some degree of treatment are returned to the Pee Dee and/or its tributaries.

Savannah River Basin

Interstate pollution of the Savannah River and other interstate waters in the Augusta, Georgia, area is caused by municipal and industrial wastes and by wastes from Federal installations. Point sources are located in both South Carolina and Georgia. If present programs for control of these sources of pollution are not satisfactory under the Water Quality Standards implementation plans of each State, the Southeast Regional Office of the FWPCA is prepared to initiate enforcement proceedings under the Federal Water Pollution Control Act.

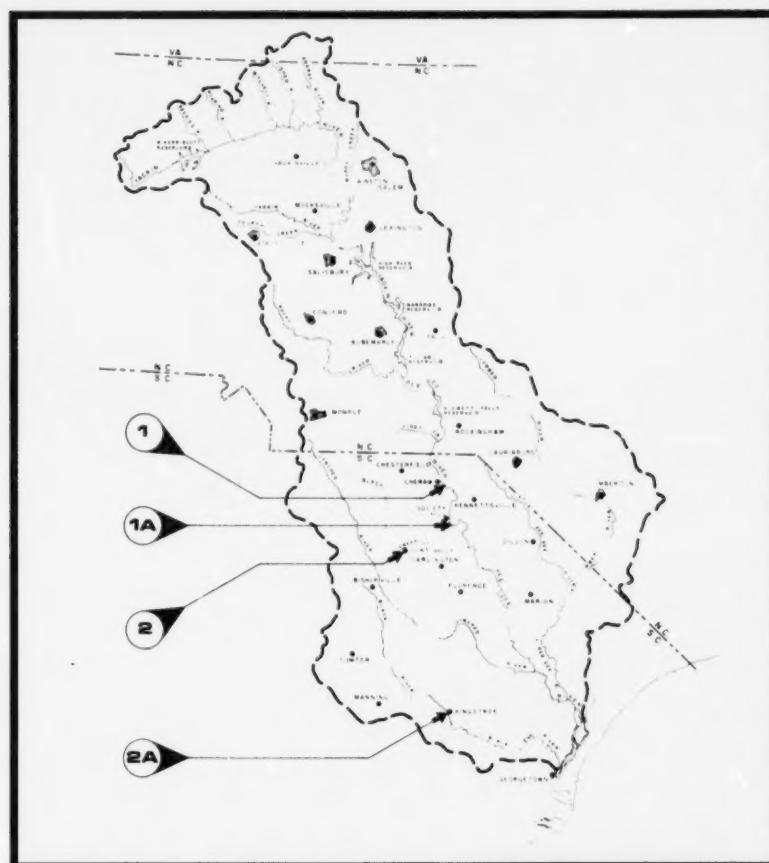
There are over 42 oxidation ponds capable of treating 3,290,000 gpd of sanitary wastes; 34 treatment facilities other than oxidation ponds capable of treating 14,920,000 gpd of sanitary wastes; 20 treatment facilities capable of treating 12,831,000 gpd of industrial wastes. Municipalities and industries have a capacity to withdraw 50,590,000 gpd of water from the Savannah and its tributaries on the South Carolina side; and return 31,041,000 gpd of wastes which have received some degree of treatment.

Broad River Basin

There are over 39 oxidation ponds capable of treating 4,017,000 gpd of sanitary wastes; 32 treatment facilities other than oxidation ponds capable of treating 7,915,000 gpd of sanitary wastes; and 46 treatment facilities capable of treating 26,180,000 gpd of industrial wastes. There are other older facilities and outfalls without treatment constructed prior to the passage of the South Carolina Pollution Control Act. The combined municipal and industrial withdrawal capability in the Basin is 109,230,000 gpd, and the combined return capability of 38,112,000 gpd of wastes which have received some degree of treatment.

MAJOR POLLUTION PROBLEMS

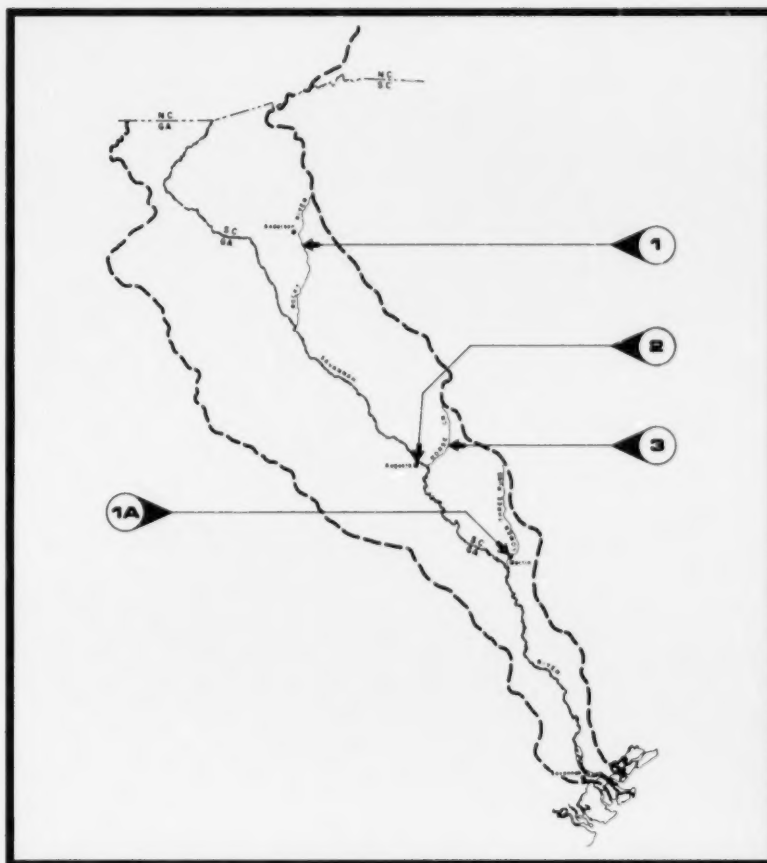
PEE DEE RIVER BASIN



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Pee Dee below Cheraw	DO, heavy metals, fluctuating pH	Textiles wastes (starch, finishing products)
2.	Black Creek below Hartsville	Oxygen depletion	Industrial wastes, pulp and paper
1A.	Pee Dee below Society Hill		Industrial expansion, dyeing and finishing
2A.	Black River @ Kingstree		Industrial expansion, intravenous solutions

See page 49 for Coastal area.

MAJOR POLLUTION PROBLEMS SAVANNAH RIVER BASIN



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Rocky River below Anderson	Taste and Odor	Glass fiber manufacturing
2.	Savannah River @ Augusta, Georgia		Municipal and Industrial wastes
3.	Horse Creek	Oxygen depletion, odor, color, aquatic growth, organic wastes	Domestic wastes & textile finishing
1A.	Lower Three Runs Creek @Martin		Wool scouring

MAJOR POLLUTION PROBLEMS

BROAD RIVER BASIN



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Pacolet Mills	Organic wastes	Textile processing
2.	Middle Tyger Lyman, Startex	Organic wastes, oxygen depletion, pH	Industrial processing, starch, heavy metals
1A.	Pacolet Mills	Organic wastes	Textile processing
2A.	Lawsons Fork to Pacolet River, Spartanburg	Organic wastes	City of Spartanburg
	Broad River below Carlisle	Organic wastes, oxygen depletion, pH	Textile processing
3A.	Broad River	Suspended solids	Runoff



Saluda River Basin

There are over 49 oxidation ponds capable of treating 3,407,000 gpd of sanitary wastes; 32 treatment facilities other than oxidation ponds capable of treating 16,412,000 gpd of sanitary wastes; and 32 treatment facilities capable of treating 22,253,950 gpd of industrial wastes. This listing does not include some older facilities and outfalls without treatment constructed prior to the South Carolina Pollution Control Act. A total of 73,150,000 gallons of water per day is withdrawn from the Saluda and its tributaries for municipal and industrial uses, and a total of 42,072,950 gpd of wastes which have received some degree of treatment are returned to the Saluda and/or its tributaries.

Catawba-Wateree River Basin

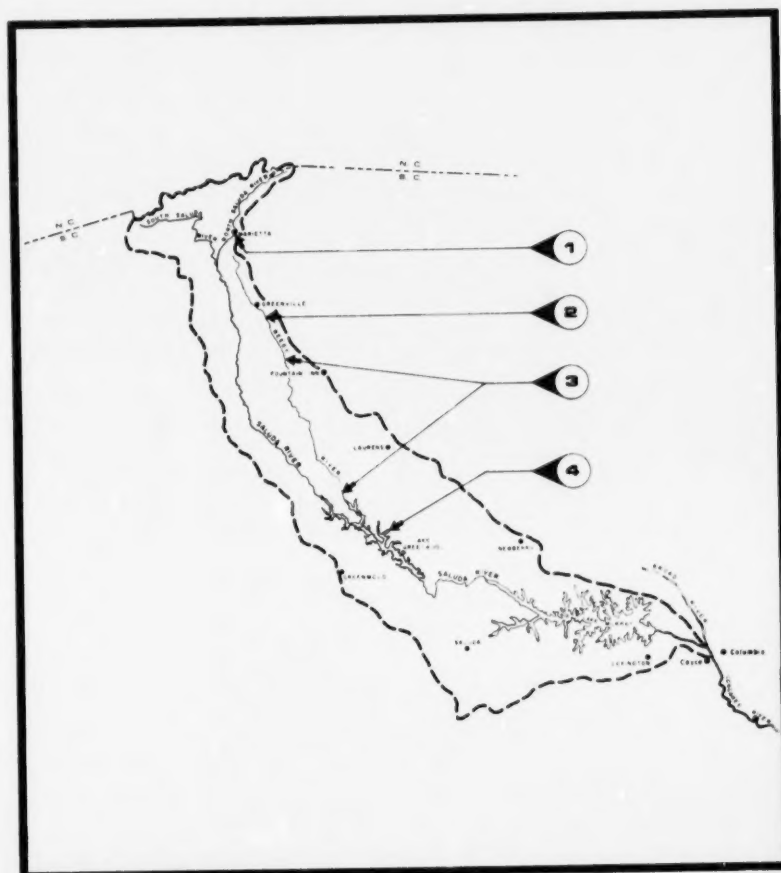
The pollution problem in Sugar Creek is caused by inadequately treated sewage from the metropolitan Charlotte, North Carolina area, and is aggravated by the very low flow in the receiving stream. The North Carolina Department of Conservation and Economic Development is understood to be studying the problem to find ways to alleviate the situation. If an adequate remedial program is not developed, the FWPCA will investigate to determine the desirability of recommending an enforcement conference on the interstate portions of the basin.

There are over 29 oxidation ponds capable of treating 2,109,650 gpd of sanitary wastes; 13 treatment facilities other than oxidation ponds capable of treating 6,704,900 gpd of sanitary wastes, and 15 facilities capable of treating 56,577,000 gpd of industrial wastes. This does not include some older unlisted outfalls. A total of 78,710,000 gpd of water is withdrawn from the Catawba-Wateree in South Carolina for municipal-industrial use, and a total of 65,371,550 gpd of wastes which have received some degree of treatment are returned to the Catawba-Wateree and/or its tributaries. A number of water quality problems have arisen due to lack of consideration in the design and operation of water and waste treatment facilities of the potential low flow conditions.

Santee-Congaree River Basin

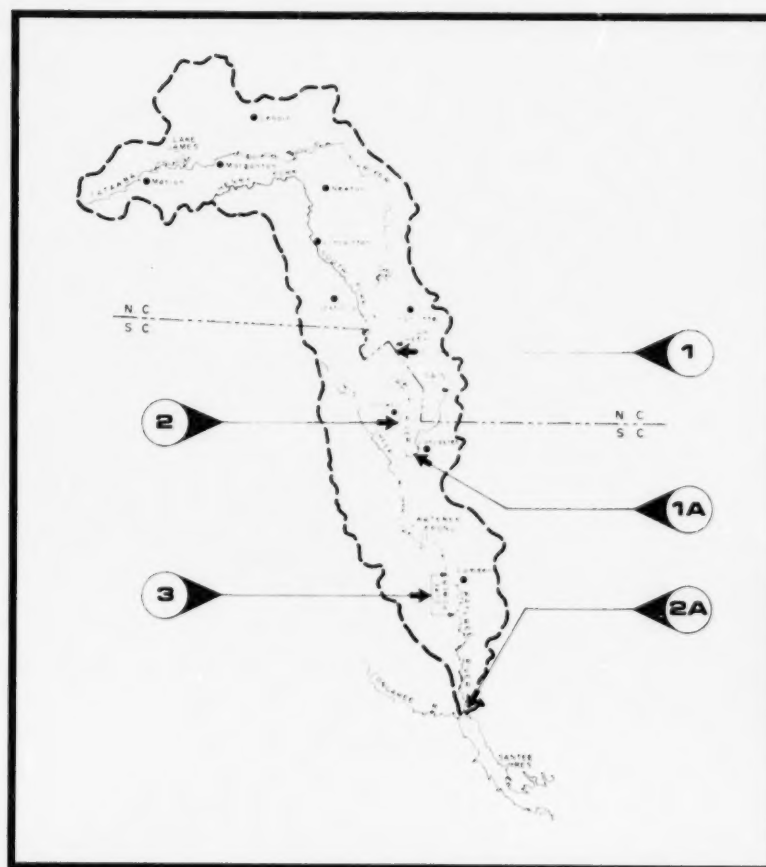
There are over 13 oxidation ponds which are capable of treating 401,000 gpd of sanitary wastes; 20 treatment facilities other than oxidation ponds capable of treating 91,500 gpd of sanitary wastes, and 11 treatment facilities capable of treating 482,500 gpd of industrial wastes. This list does not include some older facilities and outfalls. 975,000 gpd of wastes

MAJOR POLLUTION PROBLEMS SALUDA RIVER BASIN



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	North Saluda @ Marietta	Oxygen depletion, color, pH	Textile dyeing and finishing
2.	Reedy River below Greenville	Oxygen depletion, nutrients, organic wastes	Municipal-Industrial complex
3.	Reedy River, major length	Oxygen depletion, color, heavy metals	Industrial discharges from small plants
4.	Lake Greenwood	General eutrophication	Nutrients

MAJOR POLLUTION PROBLEMS CATAWBA-WATEREE RIVER BASIN



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Sugar Creek @ State line	Low DO, odor, organic wastes	Charlotte, North Carolina municipal and industrial
2-3.	Catawba River below State line	Color, DO, erratic flow	Pulp & paper processing, textile, municipal, restricted flow by hydro-power generation.
1A.	Cain Creek below Lancaster	Low DO, color, organic wastes	Bleaching, finishing, printing, textile industrial expansion
2A.	Wateree River @ Santee Resv.	Temperature, organic wastes	Steam electric installation, proposed chemical manufacturing

MAJOR POLLUTION PROBLEMS Santee-Congaree River Basin



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Congaree River @ and below Columbia	Organic	Municipal discharge
2.	Santee River below Jamestown	Organic	Wool scouring

See page 49 for Coastal area



which have received some degree of treatment are returned to the Basin and/or its tributaries.

Edisto-Salkahatchie-Coosawhatchie River Basins

There are 18 oxidation ponds capable of treating 2,010,000 gpd of sanitary wastes; 12 treatment facilities other than oxidation ponds capable of treating 5,822,000 gpd of sanitary wastes; and 14 treatment facilities capable of treating 245,401,200 gpd of industrial wastes. This inventory does not include older outfalls and facilities without treatment constructed prior to the passage of the State Act. The total of 253,233,200 gpd of wastes which have received some degree of treatment are returned to the aforementioned basins and their tributaries.

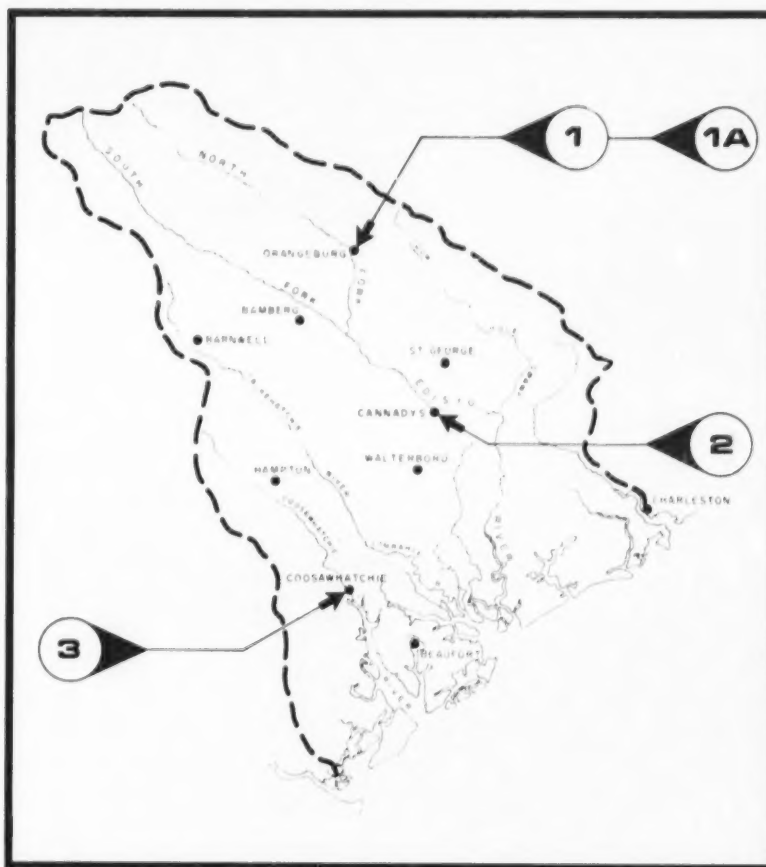
Coastal Basins

The South Carolina coastal waters have thousands of square miles that are suitable for production of oysters, clams and other shellfishes. However, in areas where populations are concentrated, the waters are closed to harvesting because of pollution. The most seriously affected areas are in the vicinity of Charleston, Georgetown, Beaufort, and Savannah, Georgia. These areas are being evaluated by the FWPCA to determine if enforcement proceedings should be initiated under the authority of the Federal Water Pollution Control Act which states, in part, "... the Secretary of the Interior shall call an enforcement conference if ... he finds that substantial economic injury results from the inability to market shellfish or shellfish products in interstate commerce because of pollution ..."

There are 94 oxidation ponds capable of treating 13,722,000 gpd of sanitary wastes; 32 treatment facilities other than oxidation ponds capable of treating 11,915,000 gpd of sanitary wastes; and 28 treatment facilities capable of treating 369,450,000 gpd of industrial wastes. 395,123,000 gpd of wastes receive some degree of treatment and are returned to the coastal waters.

MAJOR POLLUTION PROBLEMS

EDISTO-SALKAHATCHIE-COOSAWHATCHIE RIVER BASINS

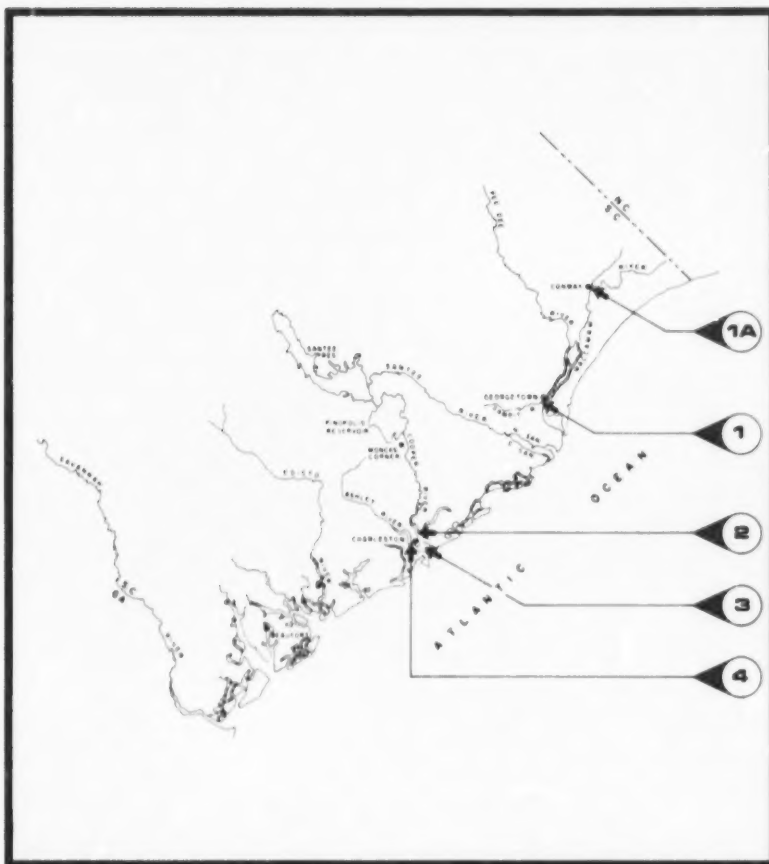


REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	North Fork Edisto, Orangeburg area	Organic wastes, periodic oxygen depletion, pH	Meat processing, textile dyeing & finishing, food processing
2.	Cannadys	Fly ash, temperature	Steam electric power generation
3.	Coosawhatchie	Organic wastes	Plastics manufacturing
1A.	Orangeburg	Organic wastes, periodic oxygen depletion, pH	Municipal expansion, new industry and expansion

See page 49 for Coastal area.

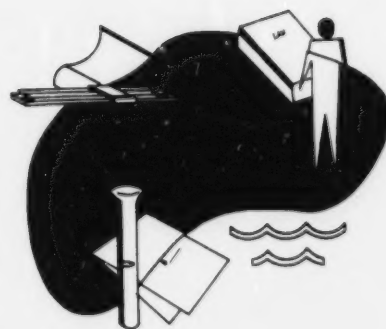
MAJOR POLLUTION PROBLEMS

COASTAL BASINS



REF.	AREA	PROBLEM	CAUSE/SOURCE
1.	Sampit River @ Georgetown	Odor, oxygen, depression, temperature eutrophication, color	Industrial wastes, pulp and paper
2.	Cooper River & harbor @ Charleston	Oxygen depletion, color, odor, sedimentation, bacterial, temperature	Industrial, Municipal & manufacturing wastes & land runoff, shipping, power generation
3.	Charleston Harbor	Petroleum (Occasional)	Marine spills
4.	Ashley River @ Charleston	Organic wastes, pesticides, oil, metals, wood preservatives	Municipal wastes, fertilizer, metallurgical, pesticide manufacturing
1A.	Waccamaw River @ Conway	Temperature, heavy metals	Manufacturing, cooling for power production

***PRESENT WATER POLLUTION
CONTROL ACTIVITIES***



SOUTH CAROLINA POLLUTION CONTROL AUTHORITY

General

The Pollution Control Authority of South Carolina, created within the Board of Health in 1950, is responsible for abating, controlling, and preventing the pollution of waters within the State. The Authority is also charged with establishing water quality standards and assigning water uses, disseminating information concerning water pollution, carrying out water sampling, conducting and coordinating research, initiating enforcement actions, preparing pollution control plans, and inspecting waste treatment facilities. The Authority is responsible for adjusting water quality standards to meet changing requirements.

The State does not have programs of financial assistance to municipalities for the construction and/or maintenance of waste treatment facilities, or to obligate the full faith and credit of the State in support of local bond issues.

The State of South Carolina receives Federal funds in support of its State program through Section 7 of the Federal Water Pollution Control Act, as amended. These funds are intended to help the State meet the cost of establishing and maintaining a pollution control program. The State must match every two dollars of Federal grant with one dollar. South Carolina has consistently overmatched the Federal allocation.

At the present time, the Authority has an authorized staff of 37, 80 percent in professional classifications. All staff, excepting field laboratory staff, are located in Columbia, and the program is administered Statewide from the Capitol. Laboratory facilities are situated in Greenville, Charleston, Lancaster, Florence, and Columbia; however, these are all inadequately staffed and, except for Columbia and Charleston, are not adequate for fulfillment of the Authority's responsibilities.

Factors which determine the Authority's ability to fulfill its mission include resources (program and facilities); organization and management; legislative authority; and personnel recruitment and management practices. Each of these essential elements is discussed in the following sections:

RESOURCES (Programs and Facilities)

Field Studies and Surveillance

The Authority has collected and examined water samples from a great many locations throughout the State; however, resources have not permitted a routine or

uniform program and some stations have not been sampled in six years. The Authority has used automatic monitoring stations at five permanent locations.

A field or special study capability as a permanent part of the organization does not exist. However, field studies are made from time to time by the laboratory staff, outside regular surveillance assignments. When this occurs, the routine laboratory and surveillance efforts are, in general, interrupted. The Authority does perform some special studies, i.e., specific industrial waste problems; special sampling; and biochemical criterion study of the Santee Basin during the summer of 1969. Erosion, sedimentation, and feedlot pollution have not until the present been considered as significant problems for study.

The basic weakness in the laboratory system is its inability to support a comprehensive monitoring and surveillance network and an aggressive enforcement program. This is due in large part to lack of laboratory staff and in lesser degree to lack of internal planning and programming activities.

Construction

Since 1956, the State of South Carolina with aid of Federal grant programs, has undertaken the construction of needed sewage treatment facilities at 176 locations. The rapid growth of population and its continuous trend upward in urban areas had resulted in an increase in the volume of municipal and industrial wastes. This, in turn, has resulted in a recent upswing in the construction of treatment facilities. Without a further increase in construction of waste treatment facilities, however, the streams of South Carolina will be severely degraded in the future. The State's program is trying to obtain a higher percentage of Federal grant participation in this construction by devising a cost-sharing program. The Department of Commerce, Appalachian Regional Commission, the Farmers Home Administration, Department of Housing and Urban Development, and the FWPCA, among others, are a few of the agencies engaged in this activity.

Facilities Inspection

There are no regularly scheduled inspections of treatment facilities, either during construction or upon completion. Requests for inspection and/or advice pertaining to facilities are met when possible. On large projects and projects of particular interest, the Authority does inspect on its own initiative.

Planning

The Authority does not have a program planning or overall planning capability. Participation in planning activities is, however, practiced throughout the Authority, and with other agencies. The State Program Grant application, which is submitted to FWPCA each year, is a statement of planning. However, this application is used to produce a statement of activity, and is not a detailed plan of action or program. The first real step in developing an Authority plan is the initiation of the joint evaluation with FWPCA of agency activity and the resultant statement of attainable goals contained herein. The Authority and FWPCA look upon this report as the first step in the development of a long-range program.

Laboratories

The Authority laboratory system consists of a central laboratory in Columbia (2 chemists, and 1 sample taker); an area laboratory in Greenville (1 chemist and 1 sample taker); and an area laboratory in Charleston (1 chemist and 1 sample taker). Supplemental laboratories are located in Lancaster (1 chemist and 1 sample taker) and Florence (the chemist is on educational leave for approximately 1 year). A mobile laboratory is stationed semi-permanently at Ridgeland for use of the State Board of Health shellfish program personnel.

There is an apparent lack of coordination and programming activity within the present laboratory system. The laboratory staff is not fully aware of the total Authority functions or mission and the central office is not kept aware of the specific laboratory activities. There is no clear procedure for keeping the Directorate informed on specific results of water quality sampling. Some water quality monitoring points, municipal and industrial, have not been sampled in six years.

Enforcement

The 1950 legislation establishing the Authority was generally adequate to deal with the pollution problems of the time. Amendments approved by the 1969 legislature do much to upgrade the earlier legislation, by strengthening its penalty and enforcement provisions.

The Authority does not now have the legal expertise required to activate this legislative mandate. In the past the Authority has made sparing use of its powers, relying instead on cooperation and persuasion. Although the Authority has enjoyed a considerable measure of success with this approach, it is believed that they must also be prepared and able to use

legal force in dealing with recalcitrant polluters. To meet this need, the Authority must have ready access, preferably in-house, to the legal staff necessary to prepare cases for enforcement action, and to follow their case through established judicial processes. The Authority must also have established administrative procedures for data collection and management which will allow legal action where necessary.

In 1968, a pollution abatement enforcement action was contested for the first time. The progress of that case suggests that the proper legal advice and procedures were not available, (or were not used), although the Authority supports one-half the salary of a legal advisor. Enforcement actions, though based on technical data, are legal actions involving specific legal procedures.

Automated Data Processing

The Authority has no automatic data processing capability. There is concern within the Authority that data is being collected, manually filed, and may never be seen again in terms of dissemination and/or utilization. The staff needs to develop an ADP capability that would allow it to scan surveillance records, industrial processing records, stream loading, applications to construct and permits to operate and be able to report in terms of past, present, and future stream loading for planning and evaluation purposes. Such a system is in the planning stage and securing necessary personnel will allow the Authority to move ahead rapidly to fulfill a much needed capability.

Water Quality Standards

South Carolina was one of the first States to adopt Statewide water quality standards. This procedure was initiated in accordance with the provisions of the 1950 enabling legislation and was completed in 1952. The South Carolina water quality standards for interstate streams were approved by the Secretary of the Interior, with some exceptions, on October 21, 1968. The detailed implementation plan, an integral part of the standards, is fully approved.

An anti-degradation amendment to the interstate water quality standards was adopted by the South Carolina Pollution Control Authority on December 4, 1968, and was subsequently accepted by the Secretary of the Interior.

Coordination

The Authority is a member of the Water Resources Commission and contributes upon request to Commission projects. Good coordination between the two

bodies has been maintained. The Authority is becoming progressively more involved in advising the Industrial Development Board and is given the opportunity to comment on specific industrial waste treatment procedures, pollution control measures, and plant site location. The Authority advises the prospective industrialist of the stream standards classification and "rules" to which he will have to conform. Good coordination and relations exist between the Authority and Federal Water Pollution Control Administration, Soil Conservation Service, and U.S. Geological Survey. The Authority has a cooperative surveillance program under which five automatic monitors are owned and operated jointly with U.S. Geological Survey.

Research and Development

There is no in-house R&D coordinator; however, the Authority has been involved in a few research projects with Clemson University, the Water Resources Research Institute, and some private individuals. There is also some coordination with other State agencies in research oriented projects. There has been some limited in-house research relative to industrial processes with the industries providing materials and methods with which to work.

Public Information

The Authority has a public information capability but is concerned primarily with answering general information requests and formulating news releases concerning grant approvals, cooperative studies, etc. The Authority is developing a small scale monograph series for TV presentation. The staff is available for personal presentations to requesting groups, but the requests are few due primarily to lack of public knowledge that the Authority exists or to the function of the Authority.

Personnel

Personnel policies, particularly salaries and hiring procedures, are tied closely to fiscal operations which are handled through the State Board of Health. The Authority is in an untenable position in personnel procurement. It is unable to set or negotiate salaries; unable to establish a specific data for perspective employees to be hired; and cannot present a specific personnel policy. There is no defined career development program or internal cross-training, except where necessity demands. The Authority has developed an internal recruiting capability which has had some measure of success, but the mechanical procedure for handling personnel applications, i.e., Merit System

evaluation etc., has proven to be extremely detrimental to the effort. In light of the difficulties being experienced, the Authority would appear to need greater autonomy over its own internal personnel and fiscal accounting capability.

Manpower

Under the Manpower Development and Training Act, the South Carolina Pollution Control Authority will sponsor the training of 80 waste treatment plant operators in FY 1970. The South Carolina Pollution Control Authority as prime contractor will be reimbursed up to \$93,637 from the U.S. Department of Labor for the on-the-job phase of the training program and the State Committee for Technical Education will receive \$31,698 for the institutional phase of the program.

The initial phase of the training program will be for 40 trainees, 20 trainees in the Sumter area and 20 trainees in the Greenville area. Twenty two weeks after the initiation of the project, August 3, 1969, an additional twenty trainees will be enrolled at both locations or at other areas in the State making a total of 80 trainees and a total contract period of 66 weeks. The program is a coupled on-the-job training project. The physical facilities and instructional staff of the South Carolina Technical Education Commission, Sumter and Greenville, will be utilized for the institutional phase of the coupled program. The OJT phase will be carried at referring waste treatment plants located within a functional project area of Sumter and Greenville by an OJT instructor. Each OJT instructor will be responsible for 20 trainees.

The program is aimed at alleviating the critical shortage of sub-professional manpower in the field of water pollution control.

The South Carolina Pollution Control Authority placed their proposal for next year into the Cooperative Area Manpower Planning System FY 1970 plan. Their proposal is to train 80 additional waste treatment plant operators and for a mobile training unit to serve isolated areas.

Water Resources Commission

The Water Resources Commission of South Carolina was established by the General Assembly in March of 1967 to formulate and establish comprehensive water resources policy, develop and establish policy on special problems concerning water resources, review projects funded by Federal aid, assure long-range interest of all groups concerned with water resources, and to recommend changes in the water resources laws.

Among many duties, the Commission is charged with the responsibility of administering the Act in terms as follows: "The Commission will advise and assist the Governor and the General Assembly in: (1) formulating and establishing a comprehensive water resources policy for the State including coordination of policies and activities in the State departments and agencies; (2) developing and establishing policies and proposals designed to meet and resolve special problems of water resource use and control within or affecting the State including consideration of the requirements of urban and rural areas; (3) reviewing the actions and policies of State agencies with water resources responsibilities to determine the consistency of such actions and policies with the comprehensive water policy of the State to recommend appropriate action where deemed necessary; (4) reviewing any project, plan or program of Federal aid affecting the use or control of any waters within the State and to recommend appropriate action where deemed necessary; (5) developing policies and recommendations to assure that the long-range interests of all groups—urban, suburban, and rural are provided for in the State's representation

on interstate water agencies; (6) recommending to the General Assembly any changes of law required to implement the policy declared in the Act; (7) such other water resources planning, policy formulation, and coordinating functions as the Governor and the General Assembly may designate".

In performance of this responsibility, the Commission is charged to consider the need for: (1) adequate supplies of surface and ground water of suitable quality for domestic, municipal, agricultural, and industrial use; (2) water quality facilities and controls to assure water of a suitable quality for all purposes; (3) water navigation facilities; (4) hydroelectric power; (5) flood damage control or prevention measures including zoning to protect people, property, and productive lands from flood losses; (6) land stabilization measures; (7) drainage measures including salinity control; (8) watershed protection and management measures; (9) outdoor recreational and fish and wildlife opportunities; (10) and any other means by which development of water and related land resources can contribute to economic growth and development for long-term preservation of the water resources and

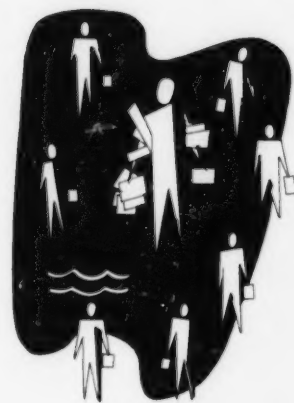
general well-being of all the people of the State.

FWPCA and Other Federal Agencies

The Federal Water Pollution Control Administration has been mandated by Congress to participate in State water pollution control programs. This participation is accomplished in two ways; direct and/or matching grants, and services, i.e., technical, advisory, joint activities. Grants are made directly to municipalities for waste treatment facilities construction; to agencies and institutions for research endeavor relating to pollution control; to pollution control agencies to aid in establishing and maintaining the State pollution control function; and to localities for pollution control planning. Joint activities and service participation are accomplished through surveillance activities, water quality standards and river basin planning.

Other Federal agencies involved in working toward concurrent State/Federal objectives are the Bureau of Sport Fisheries and Wildlife, the Corps of Engineers, the Department of Commerce, and the Department of Housing and Urban Development. This partial list is indicative of the broad range of interest represented at the Federal level.

**STATE WATER POLLUTION
CONTROL PROGRAM**



BASIC STATE POLLUTION CONTROL PROGRAM

A State pollution control program can be described in five basic elements of effort. These elements are: program administration, planning, facilities, technical services, and enforcement.



1. PROGRAM ADMINISTRATION

Program administration is the umbrella organization dealing primarily with those functions which are across-the-board activity or which are so localized as to be under the direct supervision of the program administrator. Functionally the administration can be broken down into nine areas of activity:

a. Fiscal—The fiscal capability would include budget, accounting, and fiscal awareness. Central to the operation of any water pollution control agency is its budget. Budgeting draws from across-the-board activity in allocating funds to accomplish specific, essential activities. Another function of the fiscal effort is cost accounting. Cost accounting should be operated in such a manner that the program administrator and the staff can at any time ascertain the fiscal position of the agency and can be provided with periodic reports.

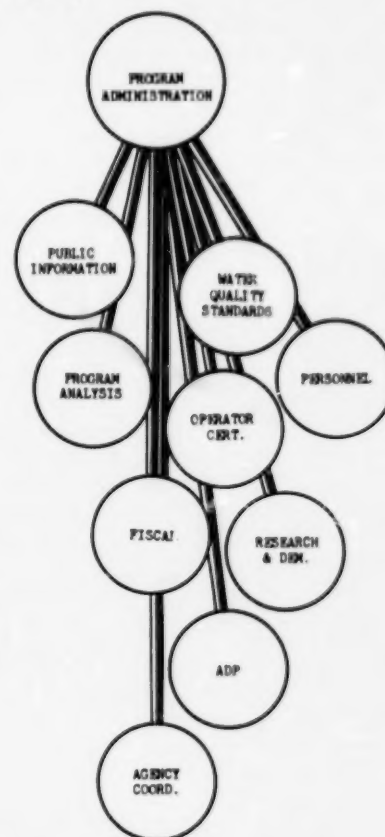
b. Personnel—A personnel capability has as its prime objective recruiting and keeping people. Recruiting is planned and not a by-chance operation. In recruiting, the picture of an agency must be presented clearly and candidly. Prospective employees have a long memory, and when and if employed, promises made at recruiting sessions are generally brought back to life. Therefore, the agency must be presented in its best light but in a true light. Personnel recruitment involves providing competitive salaries, attractive fringe benefits and a thorough knowledge of the organization. Recruiting must therefore be an in-house activity and not a generalized activity of a parent organization removed from the pollution control operation, or a State employment agency which cannot give the detail necessary to interest prospective employees in the pollution control agency.

Having recruited a person the agency should have an orientation program administered by the personnel staff or personnel director which gives the opportunity in more detail to inform the employee of the agency activity. An employee must feel that there is a chance for advancement and must be able to ascertain to what level in the organization he can aspire. Therefore, a clearly stated personnel policy is essential to the operation of any agency. The personnel policy must include an incentive program to award those who perform within certain parameters.

Continuing staff training and career development is another aspect of personnel administration. The opportunity for graduate study is a significant drawing card in recruiting but graduate training programs should be developed in a manner which provides for adequate backup staff.

c. Interagency coordination—Since water pollution control affects a number of other State activities, e.g., water resources, planning, soil conservation, highway construction, land development, etc. which have a legal or implied interest in water pollution it is essential that good interagency coordination be initiated and maintained at the top management level. Only through such coordination can the operational level adequately perform and function. This can be accomplished in part by membership on interagency commissions, boards, and committees. It can be accomplished also by personal

contact. Another area of agency coordination is the rapport established between the agency, the executive, legislative, and judicial branches of the State government. Contact with legislative committees is extremely important in informing the caretakers of government of the agency activity both quantitatively and qualitatively. It is also the mechanism by which the State agency receives fund appropriations and personnel allocations. These contacts are the life-blood of the State agency.



An effective relationship between the State agency and the executive office of the State must be maintained in order to effect legislative changes essential to accomplishment of the agency's objective. The judicial branch of the State government is generally directly involved in the water pollution control agencies enforcement actions. To be able to presuppose the disposition and action of the judiciary in a proceeding can be of considerable value to the agency. A thorough understanding of the law by the agency administrator as interpreted by the Attorney General or the judiciary can add appre-

ciably to the confidence of the agency.

Coordination between the agency and other related Federal agencies can be of great value to the State water pollution control agency in maintaining awareness of national objectives as they relate to State activities. Since citizens groups such as the League of Women Voters, and the Izaak Walton League, can be prime movers of public opinion and as public opinion is in large part the basis for legislative action, thorough knowledge of the pollution control program by these organizations is very important. The agency has a prime responsibility in keeping these organizations apprised of the water pollution control problems and progress being made in the State.

d. Public information—A water pollution control agency should have the capability of keeping the public informed of the agency programs, what impact these programs have on the individual citizens, and what he must do to gain the maximum benefits from the programs. The agency should be capable of responding to requests for information as candidly and rapidly as possible.

e. Program analysis—Program analysis is a management technique in the planning, programming, and budgeting system. It is an explicit quantitative analysis which is designed to maximize or at least increase the value of the objectives achieved by the organization, minus the cost of the resources it uses. Its value and influence lie in the collection, organization and evaluation of all the program and program related information necessary to support a balanced and effective management.

Functionally, it identifies and evaluates contribution of programs towards stated agency objectives and sub-goals as outlined by the agency director giving due consideration to program interaction and support activity. Based on its evaluation, improvements in program management are recommended and specific project priorities and resource levels are established. Considerations are the relationship of project benefit to cost and alternative means of achieving equivalent effectiveness.

To insure that program evaluation is based on adequate and timely information, it is essential that a project reporting management system be developed. Utilizing such a system, program effectiveness may be determined at any point in time and adjustments

made as required in objectives and direction of resource effort.

f. Research and demonstration—Generally speaking an in-house research capability in a State water pollution control agency is unrealistic. The agency should, however, have a capability in research dealing primarily with coordination. This capability should provide a clearinghouse for research and demonstration activities throughout the State and should be a repository of knowledge for research activities throughout the country. The coordination would involve State agencies dealing in research such as highway departments, natural resources, water resources, fisheries, etc.; it would involve also industrial research as it pertains to pollution or processing techniques; research being carried on in the universities through Federal programs and even graduate research; research being done by private organizations; and research being at the Federal level or through Federal grant systems. A research and demonstration capability in the State agency could preclude duplication in research activity and would add considerably to the stature of the State agency as the clearinghouse for research dealing with water pollution.

g. Automatic data processing—In all water pollution control agencies the data required to effectively manage the programs may be classified under the three major types of information systems. They are (1) financial-accounting system; (2) personnel system; and (3) environmental systems (engineering, physical, chemical and biological data).

Though these systems have various interface levels they may be treated separately from an organizational viewpoint. The major similarity that does exist between them is that they are all concerned with internal, historical and recurring events. At the present time these systems exist in each agency though the degree of automation, as has been previously mentioned, is highly variable.

The main problem; what is the approach an agency should take in automating these systems? First, suppose we consider the system that will produce the most rapid benefits for management in helping them control pollution. Though a great deal has been accomplished in the area of simu-

lation and forecasting models they are still in their infancy in water pollution control activities. A number of models are presently computer operational and these have proved to be valuable tools in the evaluation of estuarine and river basins in being able to provide the analyst with a large series of alternates under various conditions. These models substantially reduce the man-hour requirements in viewing alternate courses of actions that are feasible in the solution of pollution problems.

It is the practice of model builders and analysts to assist others in employing these models and a number of them have been published and disseminated to agencies having activities in this area.

In the implementation of these models, large-scale computers are generally required. Since most cities today have a number of these systems the problem of implementation is reduced to finding an installation that will rent computer time. This time is generally available at night on a somewhat reduced hourly-rate basis. In addition to securing computer access the final implementation phase usually results in making the model compatible with the computer system, i.e., certain minor programming changes may be required. Assistance in this is available in FWPCA.

The second sub-system mentioned above is the most critical for program management in being able to control the vast quantities of water quality information. This sub-system would normally be employed to determine the present and possibly future problem areas in the State. Generally, information processed through this sub-system may be analyzed to determine both the type of model or models to employ and the locational area for its employment.

In order to evaluate the specific type of system employed here the actual information requirements of the user must first be determined. In most of these systems the keynote is simplicity of use and flexibility in both the input data handling and output report formats. Generally, these systems should meet the following broad requirements:

- (1) Allow the user to specify data retrieval by a large number of sub-classes, i.e., by basin, date, stream, etc.
- (2) Allow the user to specify his information output and the report format.

(3) The operation of the system from a user standpoint should be extremely simple.

(4) The system should be flexible so that new parameters may be entered without reprogramming. Additional retrieval requirements change.

This type of system is actually a data processing system or may be classified in the overall category of business systems application. Usually smaller scale computers with hourly rates of \$45-\$60/hour should be employed. A great deal of information is moved through the computer processor, via tapes, etc. but few computations are required. The reverse of this is the simulation and forecasting models where small quantities of information are read in and a great deal of computational work is performed by the processor.

The third sub-system mentioned above is contained at just about every computer installation in the country. Standard statistical packages are available for practically every type of numerical problem. This is classified here as a sub-system of the environmental system for the main reason that the employment of these packages would be higher in terms of the utilization in scientific engineering work than in either the accounting or personnel systems in water pollution control activities.

The problem itself determines the implementation. For simple statistical calculation the user normally follows the instructions given with the package on setting up his data to conform to the programs input requirements. On more complex work the user may require either a systems analyst or senior programmer to write the necessary linkage required to employ several different packages. Again, assistance is available for aiding the States in implementation of this sub-system to meet these requirements.

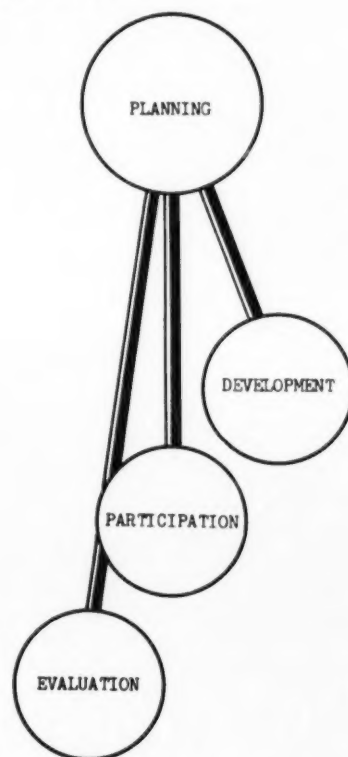
h. Operator examination and certification—The State water pollution control agency should have direct responsibility for treatment plant operator certification. The agency should have the major responsibility for composing the certification examination and should have major representation on the board of examiners. The agency should be the certifying authority for treatment plant operator certification.

i. Water quality standards—Generally the State agency charged with the

responsibility of enforcing the State's water pollution control laws also has the responsibility to adopt or modify State water quality standards. Water quality standards consist of three phases; classifying uses of water, establishing water quality criteria, and developing an implementation time table for construction of needed treatment facilities. The desire for stream reclassification whether expressed as State policy or public demand, must be accommodated by the pollution control agency. The action of "public hearing" to set or change standards is an agency administrative responsibility. The results in changes in stream classifications must be noted in the plan of implementation which will result in a change or an amendment to the water quality standards.

2. PLANNING

Planning can be thought of in three areas of effort:



a. Evaluation—The State agency should have the capability of evaluating proposals for facility construction and proposals for development that have bearing on pollution. These proposals would be from the Federal establishments, State agencies, regional plans, metropolitan and local plans, and private plans. The evaluating function

would necessarily draw heavily from other elements of the State effort. In evaluating proposals, the agency should have the capability of evaluating legislation and economies pertaining to proposals that are being considered. Situations evolving from evaluation of proposals may necessitate a re-evaluation of legislation both at the State level and that pertaining to the local level.

b. Development—Within the planning capability should be a development effort which would in essence take the plans of other State agencies and studies and the collating of these studies into a State pollution control plan. The State pollution control plan would involve a statement of policy of the State agency, alternatives of design location and economies, institutional arrangements as to best serve the needs and priorities for construction. The State pollution control plan would be one of the guiding documents in evaluating proposals and administrative policy.

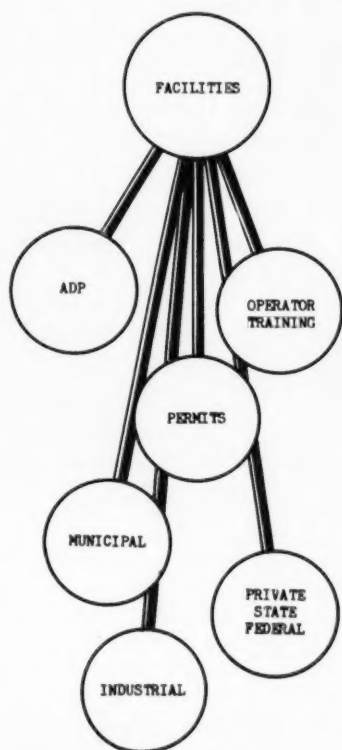
c. Coordination and/or participation—Having stated the need for top management interagency coordination, the planning activity of the agency should be directly involved as the participant in planning activities of other State agencies such as natural resources, water resources, industrial commission, Department of Planning, and any other State agencies and Federal agencies such as the FWPCA and other resource agencies, and private organizations. Development of a State pollution control plan is primarily contingent upon the coordination and participation of other agencies and other activities.

3. FACILITIES CONSTRUCTION

A major responsibility of the State pollution control agency is its involvement in the construction of waste treatment facilities. The State should have the capability of ascertaining where, when and what type of facilities should be constructed. This effort can be thought of in several categories.

a. Facilities review and inspection—Having ascertained administratively and operationally the type and location of facility needed, the agency must have the capability of following through with the plan. Common to all facility construction (municipal and industrial, State and private) is the agency capability of reviewing the construction plans and specifications. After the tech-

nical feasibility of the facility to be constructed has been determined and approved the agency should then have the capability of inspecting the facility during construction to assure that the facility is being properly constructed and to call attention to any inadequacies. Upon completion of construction there should be a continuing facility inspection to determine if the facility is being operated properly and maintained at maximum efficiency. The agency should have the capability



of advising the State, Federal, and all private organizations in advisory and technical capacities.

Another feature common to only municipal construction is the providing of financial assistance that would be authorized under a matching State grant program for Federally-assisted projects as well as those projects not applying for Federal assistance. For those projects applying for Federal assistance the State agency must develop the criteria system and establish

priorities based on pollution and financial needs.

b. Permits—A permit should be required for all waste treatment construction projects.

c. Maintenance and operation—The State agency should require and be able to determine that facilities are operated properly and at maximum efficiency. Program elements should include operator training, formalized community assurance that plants can be operated; adequacy of design, placement, and the overall need based on input from other elements of the State program. The facility's function should input to a data processing system such things as facility operating reports, maintenance and operation information and inspection information.

4. TECHNICAL SERVICES

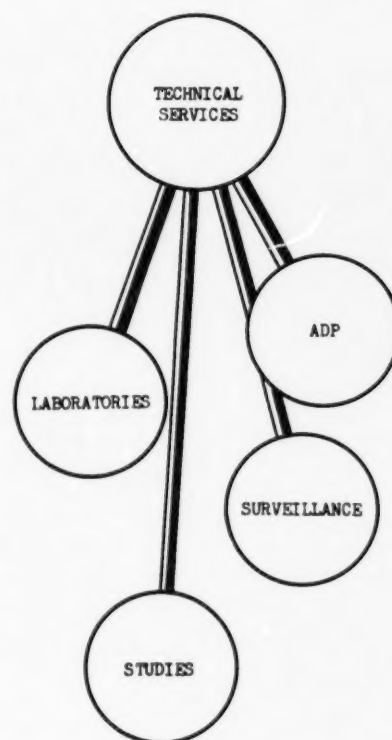
Technical services is the investigative arm.

a. Laboratories—Adequate and efficient laboratory or laboratories must be maintained to provide support for the programs and activities of the pollution control agency. The laboratory system will ordinarily evolve about a central laboratory preferably located convenient to the administration of the agency. This provides for better coordination between the agency and the laboratory in relation to programs and activity. It also permits continuous interchange of information between the laboratory personnel and other personnel of the agency and enhances responsiveness of the laboratory staff to changing needs of the various programs and activities underway. The central laboratory should have full capability to analyze and investigate within the full parameter of water pollution. Depending on the size of the State and the scope of the problem, the agency may need area laboratories. Area laboratories would not necessarily have full capabilities of the central laboratory, and might be aligned to area problems. A mobile laboratory is useful for special studies and for emergency situations. Laboratory service should have the capability of very short term special studies, such as immediate investigation of oil spills, or fish kills, etc.

b. Studies—State pollution control agencies must have in-house capabilities for field studies. Studies would involve basin surveys, cooperative studies with other State agencies, such as water

resources, natural resources, and engagements in special studies such as pesticides, vessel pollution, erosion, and sedimentation, thermal enrichment, feedlot, on-site treatment, and mine drainage. Certain aspects of a studies capability and laboratory capability could be thought of as an extension of the administrative research and development effort.

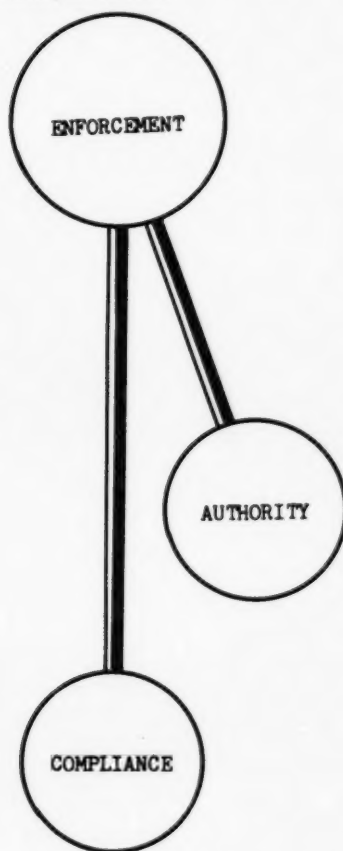
c. Surveillance—Surveillance in terms of stream monitoring and sampling is a necessary informational effort of the



State water pollution control agency. An established surveillance system noting location of stations and frequency of sampling and parameters to be sampled is the only means of establishing water quality information within the State. Surveillance also includes short-duration field studies in trouble areas. Surveillance as an operational element should also draw on information supplied by other State agencies. Utilization of other State agency personnel could greatly reduce the necessary staff for surveillance.

5. ENFORCEMENT

a. **Authority**—A State agency has three distinct areas of authority with which to require compliance. They are: legislative base, water quality standards, and other regulations. The legislative base is the authority delegated the agency by the State. Water quality standards reflect the desire of the people as to the quality of the stream. Regulations are legal restrictions of the agency or other agencies such as feedlot regulations and dredging regulations. Based on these three regulatory instruments the agency derives its authority to enforce.



b. **Compliance**—These actions can be thought of as informal action, inter-agency action, interstate conference, and water quality standards enforcement actions. An efficient compliance operation is of course based on the knowledge of the operating authority and the understanding of the Attorney General who is the legal arm of the State pollution control agency. A compliance effort is the end result of agency activity, and as such it would draw heavily on the other elements of the State program.

PROPOSED PROGRAM IMPROVEMENT

SOUTH CAROLINA POLLUTION CONTROL AUTHORITY

The existing State water pollution control program has been compared with both the basic program and with identified emerging needs in South Carolina. A series of workload analyses and program development profiles were then developed as a basis for identification of

specific staff needs. Areas of proposed improvement are discussed in the following section. The program projected in this section is predicated on the assumption that funds and facilities will be provided.

The proposed organization is based on the establishment of four regional offices, each of which would have the capabilities of carrying out routine program assignments. The regional offices will receive central office support in administration and management, legal services, personnel and speciality areas such as industrial wastes. Each region and the Central Office will also be provided with suitable labora-

tory resources necessary to carry out their respective program missions. A centrally located field team will also be provided for short-term assignments to the region for investigation of specific problems. Utilization of the regional organization should improve the Authority's "public visibility", minimize travel, and do much to keep the total program in touch with local and area problems and needs.

The personnel resources needed to carry out existing programs and the suggested program improvements are indicated in the Table below.

PERSONNEL REQUIREMENTS

POSITION	PRIMARY ASSIGNMENT	PRESENT AUTHORIZED	PROPOSED INCREASE	TOTAL REQUIREMENTS BEGINNING IN 1971
Executive Director	Administration	1	0	1
Assistant Executive Director	Administration	1	0	1
Admin. Assistant for Program Information	Administration	0	1	1
Special Projects and Laboratory Coordinator	Administration	0	1	1
Admin. Assistant for Program Analysis	Administration	0	1	1
Personnel Officer	Administration	0	1	1
Legal Counsel	Administration	1	0	1
Engineer	Surveillance	3	2	5
Technician	Surveillance	0	5	5
Data Clerk	Surveillance/ADP (2)	0	10	10
Chemist	Laboratory	8	2	10
Biologist	Laboratory	2	4	6
Bacteriologist	Laboratory	0	6	6
Laboratory Technician	Laboratory	7	7	14
Programmer, ADP	ADP	0	1	1
Key-Punch Verifier	ADP	0	1	1
Engineer, Chief	Operation & Maintenance, Plan & Specification Review, Construction Inspection, Operator Education	1	0	1
Engineer, Regional		0	5	5
Engineer, Staff		2	0	2
Regional Engineer Technician		4	6	10
Planner, Water Resource	Planning	0	1	1
Engineer, Planning	Planning	0	1	1
Clerk-Steno		6	14	20
Secretary		2	3	5
		38	72	110

I. GENERAL ADMINISTRATION

The administrative staff will be expanded to include:

a. a Grants Coordinator to be responsible for developing a program for identifying and coordinating grant activities with the municipalities, counties, universities and other agencies and for maintaining a clearing house for research and grant activities pertaining to water pollution control.

b. a Program Analyst to further refine and develop the Authority program and to initiate a program of continuing evaluation based upon a management reporting system to be developed.

c. a Personnel and Fiscal Officer to promulgate a personnel management program and develop an in-house fiscal management capability.

d. the development of internal administrative guides and program reporting systems including necessary delegations of authority.

e. Assistance to the Director in preparing special reports to the Governor and the Legislature and in responding to informational requests from news media, school systems, individuals and interest groups.

II. DESIGN, REFINE AND IMPLEMENT AN AUTOMATIC DATA PROCESSING CAPABILITY FOR STORAGE, RETRIEVAL AND REPORTING OF WATER QUALITY DATA

The ADP Systems unit, as shown in the generalized program, will service all program activities. In the initial development of the ADP group, it may not be feasible or practical to supply total service to all activities. As ADP capabilities are developed and an understanding and appreciation of the data collection activities and organizational informational requirements is gained, the ADP unit will be expanded as systems within the Authority are implemented.

The initial establishment of the ADP staff should be governed by the priorities set on program goals. As the original or priority goals are reached; transfer, to a certain degree, of priority goal establishment will be taken up by the ADP activity itself. This will allow ADP personnel a degree of latitude in the determination of systems that will produce the highest benefits for the Authority from both a program viewpoint and cost savings. This transfer of priority responsibility necessitates adequate communication between top management within the program and the head of the ADP services.

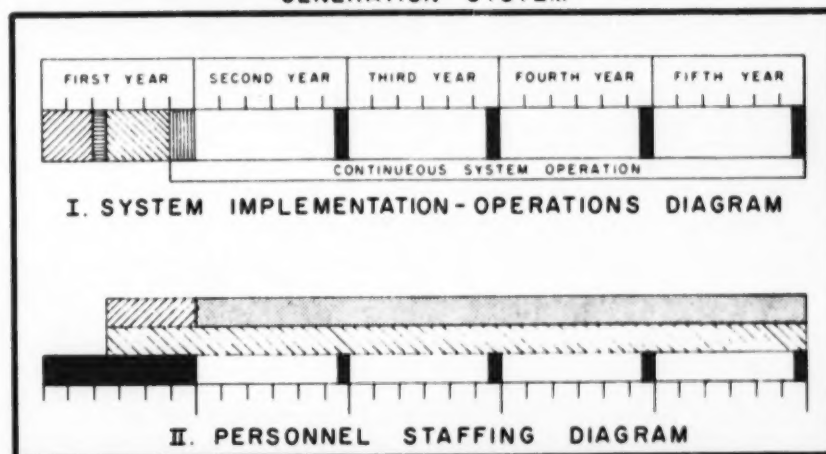
The initial goal for the ADP unit will be the establishment of an automatic system for storing, retrieving, and report generation for all the water quality data collected in the State.

To accomplish this goal, initial implementation will require hiring a systems analyst and/or programmer who would occupy a position of ADP Services Director. He will conduct an initial study to explicitly define the Authority requirements for handling the water quality data. This phase will require him to work very closely with all users of water quality data and outline report preparation, time frames, retrieval types, parameter requirements, informational output formats, update file maintenance procedures, and the

systems logic diagrams. The conclusion of this phase should result in a report that would be followed by the Authority for the handling and processing of water quality data. Approximately four man-months would be devoted to this. At the completion of this phase, the analyst will proceed to study other requirements in relation to requests for information from other agencies. This phase would require approximately one man-month of effort, and should produce identification of possible problem areas and the solutions to these problems for data compatibility

interchange. At the conclusion of this study, the Authority will plan to add additional staff including computer programmer and key-punch verifier operator. The programmer will work closely with the systems analyst for the remainder of the fiscal year to write, modify, and debug the system programs. The key-punch verifier operator would begin to prepare the water quality data for entry into the system and punch programs and test data as required by both programmer and the systems analyst. The quantity of data collected and entered into the water qual-

I. WATER QUALITY STORAGE-RETRIEVAL-REPORT GENERATION SYSTEM



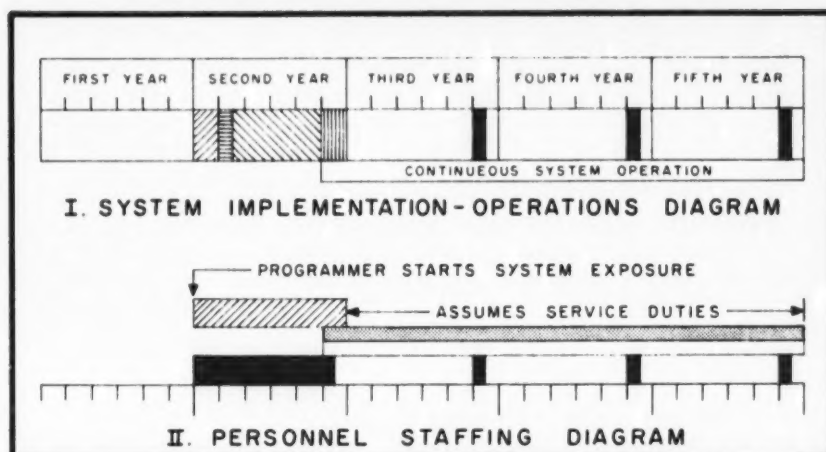
I. KEY IMPLEMENTATION

- AGENCY REQUIREMENTS
- PROGRAMMING-SYSTEMS TESTING
- USER CRITIQUE PERIOD
- DATA COMPATIBILITY INTERCHANGE STUDY
- YEARLY CRITIQUE PERIOD

II. KEY STAFFING

- SYSTEMS ANALYST / PROGRAMMER
- DATA CLERK
- DATA CLERK
- KEYPUNCH-VERIFIER OPERATOR

II. WATER QUALITY ENFORCEMENT SYSTEM



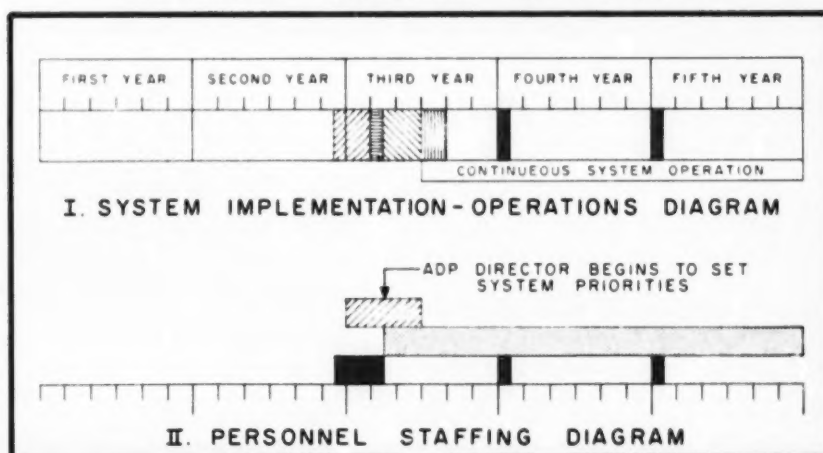
I. KEY IMPLEMENTATION

- AGENCY REQUIREMENTS
- PROGRAMMING-SYSTEMS TESTING
- USER CRITIQUE PERIOD
- LEGAL ASPECTS OF ENFORCEMENT SYSTEM
- YEARLY CRITIQUE PERIOD

II. KEY STAFFING

- SYSTEMS ANALYST / PROGRAMMER
- DATA CLERK
- DATA CLERK (TIME ALLOCATED BETWEEN W.Q. STRG SYS. & ENF.)
- (NEW HIRE) KEYPUNCH OPERATOR

III. MUNICIPAL - INDUSTRIAL WASTE SYSTEM



I. KEY IMPLEMENTATION

- AGENCY REQUIREMENTS
- PROGRAMMING-SYSTEMS TESTING
- USER CRITIQUE PERIOD
- OTHER AGENCY REQUIREMENTS
- YEARLY CRITIQUE PERIOD

II. KEY STAFFING

- SYSTEMS ANALYST / PROGRAMMER
- DATA CLERK
- DATA CLERK

ity system will require continuous key-punch and verification services. At the end of the first year, a programmer-trainee will be hired to assume the duties of systems operation, file maintenance, and control. During the second year, and in subsequent years, the ADP Services Director will perform a yearly system critique to insure that the system is meeting the needs of the Authority.

At the beginning of the second year, the systems analyst will begin to obtain the requirements for utilization of the water quality file from the water quality system to design the enforcement system. Also at this time, the programmer should begin to be exposed to a certain degree of systems work. Approximately two man-months effort should be spent by the systems analyst in clearly defining the enforcement system requirements. The analyst should plan to spend one month investigating the legal aspects of the enforcement system, and develop appropriate information output formats. Programming and systems testing will require both an analyst and programmer. At the completion of the systems programming effort, an additional programmer trainee should be hired. This staff member would operate and maintain the enforcement system. Also at this time, a key-punch operator's position should be created.

During the latter part of the second year, effort by the systems analyst will be directed toward development of a municipal and industrial waste inventory system. Approximately four man-months of effort by the systems analyst may be required to determine agency requirements. After the first month, the programmer should begin to work closely with the analyst. Three man-months of the programmer's time should be spent on this system, and after this period a clerical assistant should be hired to begin to gain exposure to the inventory system. At the completion of the inventory system, this assistant would operate and control the inventory system.

A number of items should be noted in these figures. First, after 25 man-months effort by the systems analyst, he will begin to establish ADP priorities and assume a service function. The first programmer hired would assume a service function after 24 months. The first programmer-trainee hired would begin actual programming experience after a two month period on the water quality enforcement system. He should assume the responsibilities for programming the in-

ventory system. This system does not require high level programming, and can usually be accomplished by a relatively low-level programmer.

The implementation of the agency's information systems should occur as shown in the following:

1. Water quality storage retrieval report system—operational at the end of the first year.
2. Water quality enforcement system—operational at the end of ten months after the beginning of the second year.

3. Municipal industrial inventory system—operational at the end of six months after the beginning of the third year.

III. DEVELOP AND IMPLEMENT A PERSONNEL MANAGEMENT AND TRAINING PROGRAM FOR AGENCY PERSONNEL

The planned intake of personnel will emphasize recruitment of outstanding individuals resulting from the creation of new positions and/or replacing, on a planned basis, key personnel who will be lost due to normal turnover, death, and retirement. The availability of personnel will be determined by such factors as recruiting mechanisms, salary levels, job prestige, opportunities for advancement, and public acceptability in community status of the positions.

In recruiting entrance level professional and technical personnel, recruitment will be vigorous, aggressive, imaginative, and well-publicized for maximum effectiveness in securing these personnel from the primary sources such as colleges, universities, and technical schools. Consideration should be given to the following: (1) the establishment of cooperative training programs with colleges and universities, (2) summer hires of the university and high school students, (3) participation in high school and college career day activities,

- (4) aggressive visitation programs to colleges, universities, and technical schools,
- (5) the establishment of a career development training program for entrance level personnel.

The recruitment of trained professional and technical personnel will be pursued in: allied fields, consulting engineers, supply firms, and other State, Federal or local agencies.

A career development and training program will be designed to assist in meeting the two basic needs: (1) the program's responsibility for training to assure that employees have and maintain the skills necessary for effective performance in their jobs, and (2) the individual requirements of each employee to improve his own capabilities to his highest level of potential.

The program will be developed along the following lines: (1) basin orientation: to acquaint the employee with the program and give him the basic procedural

information he must have to participate effectively; (2) rotational assignment: rotating assignments to give the employee exposure to major functional operations of the program; (3) technical training: making available time and money so that employees may have the opportunity to advance their formal training through course offerings locally available; courses will have to be related to the employee's current or potential work assignments and previous academic training; (4) long-term training: the possibility of long-term training will be factored into the program as an incentive device in recruiting new employees; (5) scientific and technical meetings: employees will be given the opportunity to attend scientific and technical meetings; (6) supervisory and managerial and executive training: employees have a need for such training; the decision being left primarily to the discretion of the employee and his supervisor to decide when and what course should be taken.

IV. REFINE AND EXPAND THE MONITORING AND SURVEILLANCE NETWORK*

Surveillance in terms of stream monitoring and sampling is a necessary informational effort of the State Pollution Control program. The surveillance program's primary objective is to gather data to determine compliance with water quality standards; to provide information for planning water resources development; to determine the effectiveness of pollution abatement procedures; and to assist in research and technical services activities.

To meet this objective, the surveillance program plans, coordinates, develops and implements the collection, evaluation, and dissemination of pollution control and water quality information as required on a continuing basis. Carrying out these objectives requires that the following work areas be given consideration: (1) sampling station locations, (2) sampling frequencies, (3) parameters of concern, (4) data needs handling and transfer, (5) inventories, (6)

analytical quality control, (7) laboratory capabilities, (8) budget and manpower.

Three types of stations will be established on interstate and intrastate waters. For descriptive purposes, these stations are referred to as key, primary, and secondary; with key stations having the highest priority and primary and secondary having lower priority respectively. The following outline indicates categorically the needs and reasons for locating stations on intrastate and interstate waters.

Interstate Waters

Key Stations

State Line Stations on Major Streams
Existing Water Quality Problem Areas

Significant Stream Confluences

Primary Stations

Potential Problem Areas
Long Term (Base Line) Stations

Secondary Stations

State Line Stations on Minor Streams
Lesser Significant Stream Confluences
Clean Water Stations

Intrastate Waters

Key Stations

Existing Problem Areas

Primary Stations

Potential Problem Areas
Long Term (Base Line) Stations

Secondary Stations

Clean Water Stations

(See Page 74-79 Appendix)

*Exclusive of Coastal sampling programs necessary for the State to fulfill its responsibility under the National Stream Sanitation Program.

Sampling frequencies will be such as to allow the collection of data which will be utilized over a period of time to give a statistically acceptable representation of the applicable water quality conditions. In this respect, water quality monitoring activities will be very dynamic, in that the frequency of sampling will be reviewed and adjusted periodically to assure that the results obtained clearly define the problems and specific characteristics of the water body. Sampling must be carried out on a monthly basis, minimal, at key stations. At primary stations, samples may be taken less often, with monthly sampling from May to October, and one annual sample in the winter months. Annual sampling should be sufficient for secondary stations.

The parameters measured at each station will be appropriate for the specific problems encountered, or expected to be encountered at that station. Parameters will generally conform to the requirements of standards for intrastate waters. Additional parameters relate directly to

known problems, and for those it will be necessary to obtain base line data. Primary stations will be sampled for a somewhat larger spectrum of parameters than key stations to detect parameters which should be sampled for even a wider variety of parameters than primary stations.

Numerous Federal and State agencies also collect data, and it is highly desirable that the data be stored at a central location so that it will be readily accessible to all parties concerned. Each agency involved will be requested to make every effort to place their data in a central system as rapidly as possible, to enhance the operation of all programs. To facilitate rapid central collection and storage of data, each agency will be requested to consider the use of automatic data processing techniques.

The data handling systems proposed for the State will be compatible with the STORET system. The STORET system is utilized by both FWPCA and the U.S. Geological Survey to store all water qual-

ity data. Transfer of machine-compatible data between Federal and State agencies is most desirable, as all agencies would benefit from a maximum amount of data. Until such time that in-house data handling systems are developed by the State, the STORET system is available for use on a voluntary basis by the State.

Inventory data serves as a means by which municipal, industrial, and any other waste related information is collected, stored, and disseminated in a usable format. Consideration will be given to establishing inventory systems to insure data availability required for proper water resource management, as well as the conduct of the studies. Every waste discharge will be identified and located (see page). Periodic reports will be made by treatment plants to provide current waste stream characteristics. All internal and external programs applicable will be used to procure all available inventory data. A system for storing and retrieving data in usable format will be designed, developed, and employed.

V. ESTABLISH, STAFF AND EQUIP WATER POLLUTION CONTROL LABORATORIES ON A REGIONAL SYSTEM

Adequate laboratory capability is of paramount importance in controlling and abating water pollution in the State. The laboratory activities of the Authority will basically support three internal programs: (1) pollution surveillance, (2) special studies, (3) operation and maintenance.

Laboratory support will originate from four regional laboratories and the central laboratory in Columbia. Regional laboratories are now located in Greenville,

Charleston, Florence, and Lancaster. Present distribution appears to be adequate in providing State coverage. Major capability expressed in terms of equipment and personnel will be incorporated into the Greenville, Columbia and Charleston laboratories. (See Page 80 Appendix)

Personnel requirements for laboratory support are shown on page 65. These requirements assume that technicians will have no laboratory responsibility.

In order that industry, State and interstate pollution control agencies can effectively relate water quality data, and feel secure that water quality data produced from all the laboratories concerned are valid and will withstand legal scrutiny, the FWPCA has developed and implemented a voluntary analytical quality control program. The State should avail itself of this program.

VI. DEVELOP, UTILIZE AND MAINTAIN LONG-RANGE STATE WATER POLLUTION CONTROL PLAN

The identification of present and potential water quality problems requires the utilization of carefully administered programs to maintain water quality standards and detailed knowledge and understanding of the physical characteristics of State waters. Corrective measures are needed when the quality of a lake, river, stream, bay or estuary will not support the uses prescribed in the water quality standards.

In the development of a State water pollution control plan the State might be divided, for planning purposes, into regions, compatible with either the laboratory regions or basins. The plan will include the following major components:

(1) data on the quality of all State waters, (2) present and projected population and industrial activity statistics, (3) water quality standards for all interstate and intrastate waters and descriptions of the physical characteristics of the waters necessary to support required uses, (4) the volume and strength of wastes which can be discharged to the individual waters of the State without seriously impairing water quality, (5) economic development zones identifying areas where industries with different waste characteristics may be located to minimize the impact of wastes on State waters.

The above components of the plan together comprise the State water pollution

control plan. The plan will be in a continual state of review and reevaluation, and a plan report will be submitted to the Governor at regular intervals. Most of the input to the plan should come from the Authority; however, the planning activity should work with the other elements of the Authority and must be responsible for the preparation and any changes in the plan including changes in the water quality standards and economic development zones.

The State plan will be of assistance in identifying and recording the water quality problems which must be solved by the Authority and when necessary by action under State law.

The plan may be developed in the following stages: (1) define water quality problems and general objectives; (2) program: evaluate data available from previous work and determine the additional effort required; (3) basic studies: understanding of the aquatic environment for which the plan is being prepared; (4) evaluation and analysis: utilizing all data available to determine the nature and extent of the water quality problems; (5)

synthesis: establish attainable goals; (6) plan design: develop alternative management programs and establish priorities; (7) implementation: set courses of action recommended to promote and accomplish the proposals contained in the plan; (8) continuing process: such factors as legislation, policy, economic development and population being continually changing often not in the manner projected in the initial plan must be continually evaluated

in terms of the water quality management program. Each major change in the planning environment will require a recycle of the planning process.

The preparation and maintenance of the plan will require the substantial support of all program activities, and staff functions including water resource planning, economy, ecology, and engineering.

VII. REFINE PROCEDURE FOR ISSUING PERMITS TO CONSTRUCT & OPERATE WASTEWATER RECLAMATION FACILITIES

All existing pollution sources will be reinventoried, and any wastewater reclamation facilities not presently operating under a valid permit will be required to comply with State law. Permits issued will describe applicable capacity, and minimum performance efficiency reliability and stipulate a definite expiration. Operating facilities will be reviewed periodically to assure conformance with specific additions. Requests for permit renewals will be made the responsibility of the owner, and may require additional data to support conformance with upgrading requirements.

Existing State law requires that any person or municipality desiring to provide or operate sewage treatment facilities shall first obtain written permission for construction and discharge. Requests for permits will be processed as follows:

1. Applicant will confer with the Regional Engineer to discuss conformity with Authority standards.
2. The applicant will submit necessary permit forms, the appropriate number of sets of plans and specifications plus

design data and criteria for each unit or process to the Regional Engineer.

3. The Regional Engineer will, where appropriate, forward the information to the State Shellfish Consultant for comment.
4. The Regional Engineer will review the information and shellfish consultant's comments. After resolving any errors, omissions, or design discrepancies with the applicant, he will forward his review and comments to the Chief Review Engineer in the Central Office. The Regional Engineer will prepare his review on a plans and specifications review checklist on which he will enter detailed information as to the design of the units, compliance with State standards, etc.
5. Upon receipt of the Regional Engineer's review, the Chief Engineer will review the Regional Engineer's comments and seek recommendations of other agency sections such as planning and laboratories.
6. The Chief Engineer will then submit a consensus recommendation for conditional approval or disapproval to

the Authority.

7. The Authority will act on the recommendations.
8. Upon approval of the plans and specifications by the Regional Engineer and the Central Office, a permit to construct will be issued. The Regional Engineer should visit the project site to check construction conformance to plans and specifications, and acceptable engineering practices two to four times during construction, depending on the size and complexity of the project. He must also accompany Federal government representative inspectors on interim inspections.
9. Upon completion of the facility, the Regional Engineer will perform an operational inspection.
10. When necessary corrections have been made, the Regional Engineer will recommend the issuance of a permit to discharge. A final postconstruction inspection should be made by the Regional Engineer, the Regional Chemist and where appropriate, a Federal representative.

VIII. REFINE AND IMPLEMENT NUMERICAL CRITERIA SYSTEM FOR DETERMINING CONSTRUCTION GRANTS PRIORITIES

As a refinement of the procedures for submitting applications, and for the certification of projects for Construction Grants under the Federal Water Pollution Control Act, the following plan will be implemented in Fiscal Year 1970, to be applicable for all projects to be constructed in FY 1971. Certain other refinements could be made in the interim.

A. Scope

These regulations are established to implement and provide the basis for certification by the S.C. Pollution Control Authority of projects for waste treatment facility con-

struction grants under the Federal Water Pollution Control Act, as amended.

B. Filing of Applications

1. Application must be received by the Pollution Control Board prior to April 1 of any calendar year, to receive consideration for a Federal Construction Grant during the following Fiscal Year.
2. Any application received after April 1 may receive consideration at the Board's discretion, provided there are funds remaining in the State's allocation after all

eligible applications filed prior to April 1 have been funded.

3. Applications not receiving grants because of lack of funds will, unless the grant is withdrawn, be considered in subsequent years. However, it is important to provide additional information which may affect the project's priority.

C. Priority List and Certification

1. A list of projects eligible for priority will be established from the applications submitted prior to April 1, in accordance with the relative standings of the pro-

jects under the numerical rating system; however, those applications which have not previously received grants shall be considered first.

2. Only those applicants who can reasonably demonstrate construction will commence within the fiscal year the Federal grant

is requested, will be considered for priority.

3. In case of ties, the date of filing of the application will determine priority for receipt of grants.

D. Numerical Point System

Points will be assigned to a project on the basis of information submitted by the applicant and judgments

by the staff members of the Pollution Control Board. The total points assigned to a project will determine its relative priority rating and position on the priority list for the fiscal year. Criteria for the numerical point system will be (1) pollution control, (2) financial need, and (3) readiness to go.

1. Water Pollution Control

a. Detrimental Effect of Pollution on:

	Points Based on Existing Conditions		
	Slight or No Effect MAXIMUM	Moderate Effect MAXIMUM	Great Effect MAXIMUM
(1) Source for public water supplies	10	20	30
(2) Shellfish growing waters	10	20	25
(3) Water contact recreation	9	17	25
(4) Fish and aquatic life	7	14	21
(5) Industrial water supply	5	10	15
(6) Agricultural waters	4	8	12
(7) Recreation other than water contact	4	8	12

b. Other Considerations

- (1) Municipality under order to abate pollution by S.C. Pollution Control Authority, or must take action under Federal Enforcement proceedings 5
- (2) Conformity with Pollution Control Agency's appraisal or regionalization 5

2. Financial Need

a. Applicable Condition

	No. of Points Awarded
Cost/capita	
Under \$20.00	1
\$20-40	2
\$40-60	3
\$60-80	4
\$80-100	5
Over \$100	6

b. Debt obligation per capita (sewerage improvements)

Obligation/capita	
\$0-49	1
\$50-99	2
\$100-149	3
\$150-199	4
\$200 and over	5

3. Readiness to start construction

- a. Engineering report on file 1
- b. Plan and specifications prepared and approved by State 2
- c. Financing completed 3

IX. DEVELOP AND IMPLEMENT A PROGRAM OF OPERATION AND MAINTENANCE INSPECTIONS AND OPERATION REPORTING

Each sewage treatment facility in the State will be visually inspected monthly with consideration for seasonal operation. Visual inspection will be primarily the observation of plant effluent, receiving stream, equipment, flow charts, and laboratory records. The owners will be notified immediately of obvious operating discrepancies. The inspector will file a checklist inspection report with the Central Office.

In the Statewide inventory of treatment facilities, each facility will be classified, and such information as size, reliability characteristics, design capacity in million gallons per day, and present flow in million gallons per day documented.

A detailed technical inspection will be performed in every treatment facility bi-annually. This inspection for major facilities will encompass a full 24 hour cycle of operation. These inspections will be

performed by the Regional Engineer and such staff as he deems necessary. When problems are found that inhibit acceptable plant performance, sufficient carry-through will be initiated to correct the operational deficiencies.

Sewage treatment plant efficiency will be verified annually by use of a portable or mobile laboratory. Correctional measures must be required when applicable.

A monthly operational report will be required to be submitted for every treatment facility by a certified treatment plant operator, in sufficient detail to re-

fect effectiveness of the unit operation.* These reports will be evaluated and verified through the inspection process. The certified sewage treatment plant op-

erator should immediately notify the authority when the facility fails to provide the degree of treatment required by the permit.

X. REFINE AND IMPLEMENT THE PROCEDURAL ACTION TO ACHIEVE THE ENFORCEMENT OF WATER QUALITY STANDARDS

Where the Authority has determined that standards are being contravened and the discharger has been identified, the discharger will be notified. The Authority will work cooperatively with the discharger to ascertain the cause of the contravention. Should the discharger be uncooperative, the Authority will expeditiously instigate an administrative hearing before the board—a step which may eventually lead to court action. The Authority would render its judgment based on the data presented from the studies and data presented by the alleged polluter. If the polluter fails to comply with the Authority's decision, court action must be taken. A review of the information available for presentation to the court must be accomplished. The engineering surveys, field studies, and laboratory information must be prepared so that it is acceptable to the court. Guidance by the Authority's

legal counsel will be very important at this point because once introduced into court the polluter may select the various routes for appeal.

In the case of interstate streams, an alternate route may be selected by the Authority. If the Authority so selects to utilize this mechanism, it will request a Federal enforcement conference in the affected area. Following the enforcement conference, recommendations will be developed cooperatively by all parties concerned and through these recommendations the goal for the area will be set. For failure to comply with the recommendations of the enforcement conference, the alleged polluter will be requested to appear before a hearing board and if the hearing board judges the recommendations fair and reasonable and the polluter still fails to comply, the case will be referred to the Federal court.

There may be several combinations of actions available to the Authority. For instance it may be possible that following the State's administrative hearings, the testimony may be adequate to submit directly through the Federal court system rather than first attempting to introduce the testimony into the State court system. It is also possible that following a Federal enforcement action the State may introduce the testimony into the State courts rather than the Federal courts. The legal action that the State will take will conform to the laws that are applicable at that particular time.

Violations of Water Quality Standards requiring emergency action, i.e. oil spills, toxic materials, etc., will be prosecuted under the provisions of Section 70-116 of the Code.

XI. EVALUATE THE POLLUTION CONTROL LAWS OF THE STATE AND DEVELOP PERIODIC RECOMMENDATIONS TO STRENGTHEN AND CLARIFY THE LEGISLATION

The pollution control law of 1950 served as an adequate operating tool for many years. However, during the following decade the character of the State changed in terms of population and industrial expansion and public demands. As the Authority turned more and more to the pollution control law as its base of legal jurisdiction, the law was found to be

lacking as a functional tool. An examination of the law resulted in recommendations to strengthen it. These recommendations were enacted into law in 1969, as amendments. It is presumed that these amendments, if fully utilized, will make the law adequate.

However, there are indications that further changes should be made in the

law. Having seen the need for legislative evaluation, the Authority will immediately pursue a long-range program of continual legislative evaluation, drawing from all areas of legal counsel, and develop periodic recommendations to the General Assembly to update, strengthen, and/or clarify the existing law.

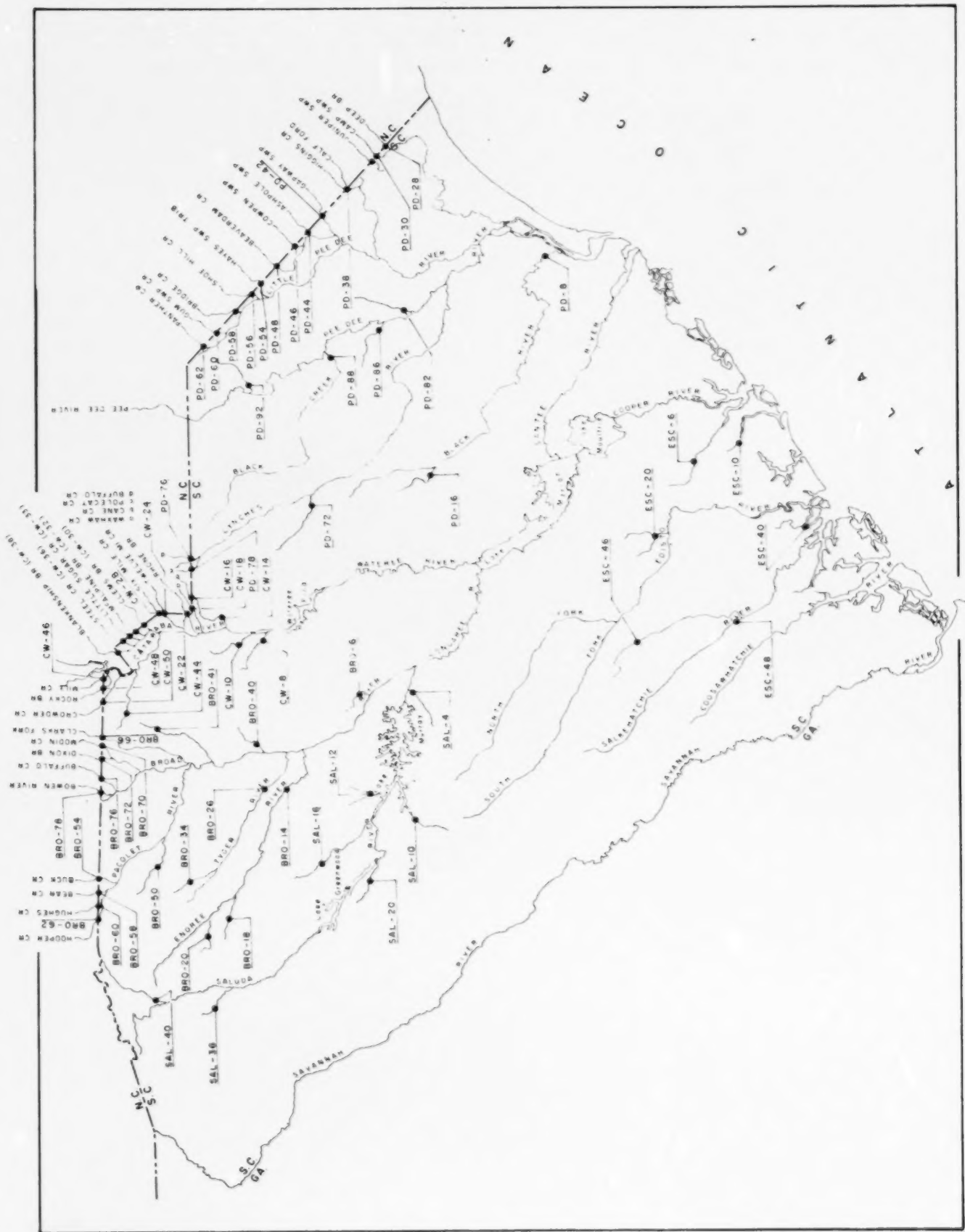
*A further detailed study should be initiated to develop a program which would make maximum use of current telemetry and ADP technologies for transmission and analysis of the treatment plant operational data. Several States and the FWPCA are now investigating such systems.

APPENDIX



STATION NUMBER	NAME OF BODY OF WATER	STATION LOCATION	PARAMETERS*					YEAR TO BE ACTIVATED	REMARKS	
			70	71	72	73	74			
EDISTO-SALKEHATCHIE-COOSAWATCHIE RIVER BASIN										
ESC-6	Cyprus Swamp R.	At mouth, near Ladson	--	--	--	--	B	1974		
ESC-10	Stono River	At Johns Island	--	--	B	B	B	1972		
ESC-20	Indian R. Field Swamp	At mouth, near Pregnal	--	--	--	--	B	1974		
ESC-40	Chehaw River	At mouth, near Chisolm	--	--	B	B	B	1972		
ESC-46	Lemon Creek	At mouth, near Bamberg	--	A	B,C	B,C	B,C	1971		
ESC-48	Salkehatchie R.	Above L. Salkehatchie confluence	--	A	B,C	B,C	B,C	1971		
PEE DEE RIVER BASIN										
PD-8	Black River	At mouth, near Georgetown	--	A	B	B	B	1971		
PD-16	Scape Oer Swamp R.	At mouth, near Sumter	--	--	B	B	B	1972		
PD-28	Deep Branch	At S.C.-N.C. State line	--	--	B	B	B	1972	Interstate clean water stream	
PD-30	Camp Swp.	" " " " " "	--	A	B	B	B	1971	" " " " " "	
PD-38	Higgins Creek	" " " " " "	--	--	B	B	B	1972	" " " " " "	
PD-42	Gapway Swp.	" " " " " "	--	A	B	B	B	1971	" " " " " "	
PD-44	Ashpole Swamp	" " " " " "	--	--	--	B	B	1973	" " " " " "	
PD-46	Cowpen Swamp	" " " " " "	--	--	B	B	B	1972	" " " " " "	
PD-48	Beaverdam Creek	" " " " " "	--	A	B	B	B	1971	" " " " " "	
PD-54	Hayes Swamp	" " " " " "	--	--	--	--	B	1974	" " " " " "	
PD-56	Shoe Hill Creek	" " " " " "	--	--	--	B	B	1973	" " " " " "	
PD-58	Bridge Creek	" " " " " "	--	--	--	--	B	1974	" " " " " "	
PD-60	Gum Swp. Creek	" " " " " "	--	--	--	B	B	1973	" " " " " "	
PD-62	Panther Creek	" " " " " "	--	--	--	--	B	1974	" " " " " "	
PD-72	Little Lynches R.	At mouth, near Bethune	--	--	B	B	B	1972		
PD-76	Buffalo Creek	At S.C.-N.C. State line	--	--	--	B	B	1973	Interstate clean water stream	
PD-78	Pole Cat Creek	At S.C.-N.C. State line	--	--	--	--	B	1974	" " " " " "	
PD-82	Catfish Creek	At mouth, near Pamlico	--	--	--	--	B	1974	" " " " " "	
PD-86	Jeffreys Creek	At mouth, at Orum	--	--	--	B	B	1973	" " " " " "	
PD-88	Black Creek	At mouth, near Darlington	--	A	B	B	B	1971	" " " " " "	
PD-92	Crooked Creek	At mouth, near Marlboro	--	--	B	B	B	1972	" " " " " "	
SALUDA RIVER BASIN										
SAL-4	Twelve Mile Creek	At Lexington	--	A	B,C	B,C	B,C	1971		
SAL-10	Little Saluda R.	At Saluda	--	A	B,C	B,C	B,C	1971		
SAL-12	Bush River	Near Prosperity	--	--	--	B	B	1973		
SAL-16	Little River	Near Mountville	--	--	--	--	B	1974		
SAL-20	Ninety-Six Creek	At Ninety Six	--	A	B	B	B	1971		
SAL-36	Brushy Creek	Near Liberty, at Pickens Co. line	--	--	B	B	B	1972		
SAL-40	N. Saluda R.	At Marietta	--	A	B,C	B,C	B,C	1971		
BROAD RIVER BASIN										
BRO-6	Little River	At Richtex	--	--	B	B	B	1972		
BRO-14	Duncan Creek	At Whitmire	--	--	--	--	B	1974		
BRO-18	Durbin Creek	Near Fountain Inn	--	--	B	B	B	1972		
BRO-26	Iyer River	At Fair Forest Cr. confluence	--	A	B,C	B,C	B,C	1971		
BRO-34	N. Iyer River	At Moore	--	--	--	B	B	1973		
BRO-50	Lawson Fork	At Whitney	--	--	--	B	B	1973		
BRO-54	Buck Creek	At S.C.-N.C. State line	--	--	--	--	B	1974	Interstate clean water stream	
BRO-58	Bear Creek	" " " " " "	--	A	B	B	B	1971	" " " " " "	
BRO-60	Hughes Creek	" " " " " "	--	--	B	B	B	1972	" " " " " "	
BRO-62	Hooper Creek	" " " " " "	--	--	--	B	B	1973	" " " " " "	
BRO-66	Clark Fork	" " " " " "	--	A	B	B	B	1971	" " " " " "	
BRO-70	Modlin Branch	" " " " " "	--	--	--	--	B	1974	" " " " " "	
BRO-72	Dixon Branch	" " " " " "	--	--	--	B	B	1973	" " " " " "	
BRO-76	Buffalo Creek	" " " " " "	--	A	B,C	B,C	B,C	1971	" " " " " "	
BRO-78	Bowen Run	" " " " " "	--	--	--	--	B	1974	" " " " " "	
CATAWBA-WATEREE RIVER BASIN										
CW-8	Rocky Creek	At mouth, near Great Falls	--	--	B	B	B	1972		
CW-10	Fishing Creek	At mouth, near Bascomville	--	--	--	B	B	1973		
CW-14	Cane Creek	Below Lancaster	--	A	B,C	B,C	B,C	1971		
CW-16	Cane Creek	At S.C.-N.C. State line	--	--	--	--	B	1974	Interstate clean water stream	
CW-18	Waxhaw Creek	" " " " " "	--	--	B	B	B	1972	" " " " " "	
CW-22	Rhone Branch	" " " " " "	--	--	--	B	B	1973	" " " " " "	
CW-24	Twelve Mile Creek	" " " " " "	--	A	B	B	B	1971	" " " " " "	
CW-28	Six Mile Creek	" " " " " "	--	--	--	--	B	1974	" " " " " "	
CW-30	Clems Branch	" " " " " "	--	--	--	--	B	1974	" " " " " "	
CW-32	McAlpine Creek	" " " " " "	--	--	--	B	B	1973	" " " " " "	
CW-33	Little Sugar Creek	" " " " " "	--	A	B,C	B,C	B,C	1971	" " " " " "	
CW-36	Steel Creek	" " " " " "	--	--	--	--	B	1974	" " " " " "	
CW-38	Blankenship Creek	" " " " " "	--	--	B	B	B	1972	" " " " " "	
CW-44	Allison Creek	Near Filbert	--	A	B,C	B,C	B,C	1971		
CW-46	Mill Creek	At S.C.-N.C. State line	--	--	--	B	B	1973	Interstate clean water stream	
CW-48	Rocky Branch	" " " " " "	--	--	--	B	B	1973	" " " " " "	
CW-50	Crowder's Creek	" " " " " "	--	A	B	B	B	1971	" " " " " "	

*A - Includes alkalinity, BOD, coliform, chloride, chromium, color, copper, dissolved oxygen, dissolved solids, flow, fluoride, hardness, iron, lead, manganese, nickel, nitrogen (total), pesticides, phosphorus (total), radiation, specific conductance, sulfate, turbidity and zinc to be sampled annually.
 B - Includes "A" plus approximately 5 additional parameters.
 C - Biological analysis to be sampled annually



STATION NUMBER	NAME OF BODY OF WATER	STATION LOCATION	PARAMETERS*					YEAR TO BE ACTIVATED	REMARKS	
			70	71	72	73	74			
EDISTO-SALKAHATCHIE-COOSAWATCHIE RIVER BASIN										
ESC-2	Ashley River	U.S. 17 S. of Charleston	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
ESC-4	Ashley River	Above Charleston, S.C.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
ESC-18	S. Edisto R.	At Jacksonboro, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
ESC-26	N. Fk., S. Edisto	At Orangeburg, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
ESC-42	Combahee R.	At U.S. 17 Bridge, SW of Greenpond	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
ESC-58	Whale Branch	N.N.W. Beaufort at U.S. 21	--	--	E,F,G	E,F,G	E,F,G	1972		
ESC-67	Beaufort R.	At Beaufort, S.C.	A,B	C,D,E	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SAVANNAH RIVER BASIN										
SAV-2	Savannah River	At Fort Jackson, Ga.	C,D,G	C,D,G	C,D,G	C,D,G	C,D,G	1969	Automatic monitor	
SAV-4	" "	Nr. Clito, Georgia	E	E	E	E	E	1970		
SAV-6	" "	U.S. 301 Bridge	E	E	E	E	E	1970		
SAV-8	" "	Nr. Aiken, Georgia	C,D,G	C,D,G	C,D,G	C,D,G	C,D,G	1969	Automatic monitor	
SAV-10	" "	At New Savannah Bluff Lock and Dam	E	E	E	E	E	1970		
SAV-12	" "	At U.S. 82 Nr. Iva S.C.	E	E	E	E	E	1970		
PEE DEE RIVER BASIN										
PD-10	Black River	At Kingstree, S.C.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-24	Waccamaw R.	At Conway, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-26	Waccamaw R.	at Longs	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-32	Pee Dee R.	At confl. of Little Pee Dee R.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-34	Little Pee Dee R.	Below Jordanville	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-40	Lumber River	At mouth	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-52	Little Pee Dee R.	Nr. Kemper, S.C.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-70	Lynchus R.	At Effingham, N.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-71	Lynchus R.	Nr. Bishopville, N.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-80	Lynchus R.	Nr. Ixahaw, N.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-87	Pee Dee R.	East of Florence @ U.S. 301 & 76	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
PD-94	Pee Dee R.	At Cheraw, N.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SANTEE-CONGAREE RIVER BASIN										
SC-2	Charleston Harbor	At Charleston, S.C.	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
SC-4	Cooper River	At Charleston, S.C.	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
SC-6	Cooper River	At N. Charleston, S.C.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SC-8	Cooper River	At Moncks Corner, S.C.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SC-10	Pinopolis Reservoir	At Pinopolis Res. Dam	--	--	E,F	E,F,G	E,F,G	1972		
SC-18	S. Santee R.	At mouth	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SC-20	N. Santee R.	At mouth	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SC-24	Santee R.	At St. Stephens, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SC-30	Congaree R.	At mouth - U.S. 601	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SC-32	Congaree R.	@ Carolina-Eastman water intake	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SALUDA RIVER BASIN										
SAL-6	Saluda R.	Above Columbia at I-26	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SAL-14	Saluda R.	At Silver Street	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SAL-28	Reedy R.	S.W. of Laurens, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SAL-29	Reedy R.	Near Fork Shoals	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SAL-30	Reedy R.	Nr. Greenville	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
SAL-32	Saluda R.	At Ware Shoals	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BROAD RIVER BASIN										
BRO-10	Broad R.	At Blairs, S.C.	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
BRO-12	Enoree R.	At mouth	A,B	C,D	E,F,G	E,F,G	E,F,G	1972		
BRO-16	Enoree R.	At S.C. 49 Nr. Enoree, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BRO-24	Tyger R.	At mouth	--	--	E,F	E,F,G	E,F,G	1972		
BRO-28	Fair Forest Creek	At Spartanburg, S.C.	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
BRO-30	Tyger R.	At S.C. Rt. 49 Jct.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BRO-38	N. Tyger R.	At Wellford, S.C.	--	--	E,F	E,F,G	E,F,G	1972		
BRO-42	Broad R.	At Lockhart, S.C.	A,B	C,D,G	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BRO-44	Pacolet R.	At mouth	--	C,D	E,F,G	E,F,G	E,F,G	1971		
BRO-46	Pacolet R.	At Pacolet Mills, S.C.	A,B	C,D	E,F,G	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BRO-48	Lawson Fork	At Glendale, S.C.	--	--	E,F	E,F,G	E,F,G	1972		
BRO-52	Pacolet R.	At Converse, S.C.	--	--	E,F	E,F,G	E,F,G	1972		
BRO-64	N. Pacolet R.	At S.C.-N.C. state line	--	C,D	E,F,G	E,F,G	E,F,G	1971		
BRO-68	Broad R.	Above Pacolet R. confluence	--	--	E,F	E,F,G	E,F,G	1972		
BRO-74	Broad R.	At Cherokee Falls, S.C.	A,B	C,D,G	E,F	E,F,G	E,F,G	1970	Cooperative State-Federal station	
BRO-80	Broad R.	At S.C.-N.C. state line	--	C,D	E,F,G	E,F,G	E,F,G	1971		
CATAWBA-WATEREE RIVER BASIN										
CW-1	Waterree R.	Near Waterree, Below Eastover	E,F,G	E,F,G	E,F,G	E,F,G	E,F,G	1969	State-Federal automatic monitor	
CW-4	Waterree R.	At Camden, S.C.	--	--	--	E,F,G	E,F,G	1972		
CW-12	Catawba R.	Near Fort Lawn	E,F,G	E,F,G	E,F,G	E,F,G	E,F,G	1969	State-Federal automatic monitor	
CW-20	Catawba R.	At Catawba	E,F,G	E,F,G	E,F,G	E,F,G	E,F,G	1969	State-Federal automatic monitor	
CW-26	Sugar Creek	At mouth	--	--	E,F	E,F,G	E,F,G	1972		
CW-34	Sugar Creek	At S.C.-N.C. state line	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
CW-40	Catawba R.	Near Rock Hill	E,F,G	E,F,G	E,F,G	E,F,G	E,F,G	1969	State-Federal automatic monitor	
CW-52	Catawba R.	At N.C.-S.C. state line	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		

*A-Includes coliform, dissolved oxygen, flow, nitrogen (total), pH, phosphorus (total), and specific conductance, to be sampled monthly.

B-Includes "A" plus alkalinity, BOD, chlorine, chromium, color, copper, dissolved solids, fluoride, hardness, iron, lead, manganese, nickel, pesticides, radiation, sulfate, turbidity and zinc to be sampled annually.

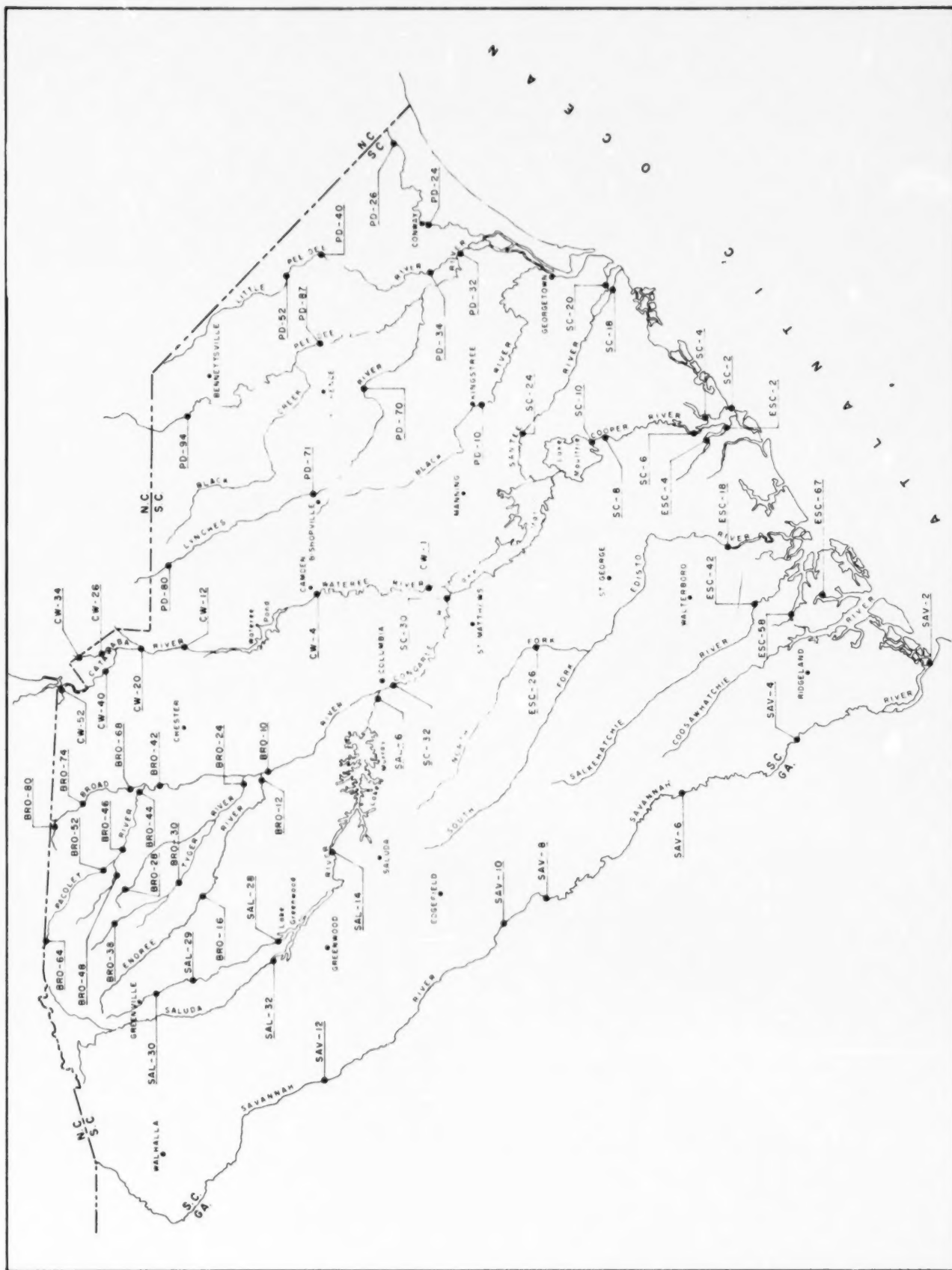
C-Includes "A" plus approximately 4 additional parameters.

E-Includes "A" plus approximately 7 additional parameters.

G-Biological analysis to be sampled annually.

D-Includes "B" plus approximately 6 additional parameters.

F-Includes "B" plus approximately 11 additional parameters.



STATION NUMBER	NAME OF BODY OF WATER	STATION LOCATION	PARAMETERS*					YEAR TO BE ACTIVATED	REMARKS	
			70	71	72	73	74			
EDISTO-SALKEHATCHIE-COOSAWATCHIE RIVER BASIN										
ESC-8	Stono River	At mouth near Centerville	--	C,D	E,F	E,F,G	E,F,G	1971		
ESC-12	N. Edisto R.	At mouth near Edisto Island	--	--	E,F	E,F,G	E,F,G	1972		
ESC-14	N. Edisto R.	At Yonges Island	--	--	E,F	E,F,G	E,F,G	1973		
ESC-16	S. Edisto R.	At mouth near Bay Point	--	--	E,F	E,F,G	E,F,G	1972		
ESC-22	S. Edisto R.	At Cannady's	--	C,D	E,F,G	E,F,G	E,F,G	1971		
ESC-24	S. Edisto R.	At Branchville	--	F	E,F	E,F,G	E,F,G	1972		
ESC-28	N. Fk. S. Edisto R.	At S.C. 3, nr. Woodford	--	--	E,F	E,F,G	E,F,G	1973		
ESC-30	Chinquapin Cr.	At Batesburg	--	C,D	E,F	E,F,G	E,F,G	1971		
ESC-32	S. Fk. Edisto R.	At S.C. 3, nr. Springfield	--	--	E,F	E,F,G	E,F,G	1972		
ESC-34	S. Fk. Edisto R.	At Aiken State Park	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
ESC-36	Ashepoo R.	At mouth, near Wiggins	--	C,D	E,F	E,F,G	E,F,G	1971		
ESC-38	Great Swamp R.	At Walterboro	--	--	E,F	E,F,G	E,F,G	1973		
ESC-44	Little Salkehatchie R.	At Colleton	--	--	E,F	E,F,G	E,F,G	1972		
ESC-50	Salkehatchie R.	At Rivers Bridge State Park	--	C,D	E,F,G	E,F,G	E,F,G	1971		
ESC-52	Salkehatchie R.	At Barnwell	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
ESC-54	St. Helena Sound	At Hunting Island State Park	--	--	E,F	E,F,G	E,F,G	1973		
ESC-56	Coosaw R.	At Wilkins	--	--	E,F	E,F,G	E,F,G	1972		
ESC-60	Broad River	At mouth, near Port Royal	--	--	E,F	E,F,G	E,F,G	1973		
ESC-62	Coosawatchie R.	At Coosawatchie	--	--	E,F	E,F,G	E,F,G	1972		
ESC-64	Coosawatchie R.	At Allendale	--	--	E,F	E,F,G	E,F,G	1972		
ESC-66	Beaufort R.	N. Side of Paris Island	--	C,D	E,F,G	E,F,G	E,F,G	1971		
ESC-68	MacKay Creek	Near Hilton Head	--	C,D	E,F	E,F,G	E,F,G	1971		
ESC-70	New River	At mouth near Bellinger	--	--	E,F	E,F,G	E,F,G	1971		
PEE DEE RIVER BASIN										
PD-2	Winyah Bay	At mouth near North Island	--	--	E,F	E,F,G	E,F,G	1972		
PD-4	Sampit R.	At mouth, near Georgetown	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		Tentative automatic monitor site
PD-6	Winyah Bay	At Georgetown	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-12	Pocotaligo R.	At Manning	--	--	E,F	E,F,G	E,F,G	1973		
PD-14	Pocotaligo R.	At Sumter	--	--	E,F	E,F,G	E,F,G	1972		
PD-18	Black R.	At Bishopville	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
PD-20	Intracoastal Waterway	At Myrtle Beach	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-22	Intracoastal Waterway	At Crescent Beach	--	--	E,F	E,F,G	E,F,G	1972		
PD-36	Little Pee Dee R.	At Gallivant's Ferry	--	--	E,F	E,F,G	E,F,G	1973		
PD-66	Pee Dee River	Below confluence of Lynchs R.	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-68	Lynches River	At mouth near Poston	--	--	E,F	E,F,G	E,F,G	1972		
PD-84	Pee Dee River	Near Pamlico	--	--	E,F	E,F,G	E,F,G	1973		
PD-89	Black Creek	At Hartsville	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		Tentative automatic monitor site
PD-90	Pee Dee River	Near Mont Clare	--	C,D	E,F,G	E,F,G	E,F,G	1971		
PD-96	Parsonage Creek	At Murrell's Inlet	--	--	E,F	E,F,G	E,F,G	1972		
SANTEE CONGAREE RIVER BASIN										
SC-12	Lake Moultrie	At Bonneau	--	--	E,F	E,F,G	E,F,G	1972		
SC-14	Moultrie Canal	Near Eadytown	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SC-16	Bull Bay	Near Awendamt	--	--	E,F	E,F,G	E,F,G	1972		
SC-22	Santee River	At Jamestown	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		Tentative automatic monitor site
SC-26	Santee River	At Santee Dam	--	C,D	E,F	E,F,G	E,F,G	1971		
SC-28	Lake Marion	At Santee State Park	--	--	E,F	E,F,G	E,F,G	1972		
SALUDA RIVER BASIN										
SAL-8	Lake Murray	Near Chapin	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SAL-18	Saluda R.	At Chappell	--	--	E,F	E,F,G	E,F,G	1972		
SAL-22	Saluda R.	At Lake Greenwood Dam	--	C,D	E,F,G	E,F,G	E,F,G	1971		
SAL-24	Lake Greenwood	Near Ninety-Six	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
SAL-26	Lake Greenwood	Near Coronaca	--	--	E,F	E,F,G	E,F,G	1972		
SAL-34	Saluda R.	At Pelzer	--	--	E,F	E,F,G	E,F,G	1973		
SAL-38	Saluda R.	At S.C. 183, near Greenville	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
SAL-42	N. Saluda R.	At Greenville Waterworks	--	C,D	E,F,G	E,F,G	E,F,G	1971		Tentative automatic monitor site
BROAD RIVER BASIN										
BRO-4	Broad River	Above Columbia	--	C,D	E,F,G	E,F,G	E,F,G	1971		
BRO-8	Broad River	At Peak	--	--	E,F	E,F,G	E,F,G	1973		
BRO-22	Enoree R.	At Pelham	--	--	E,F	E,F,G	E,F,G	1972		
BRO-32	S. Tyger River	At Switzer	--	--	E,F	E,F,G	E,F,G	1972		
BRO-36	Middle Tyger River	At Fairmont	--	C,D	E,F,G	E,F,G	E,F,G	1971		
BRO-39	Broad River	Near Carlisle	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
BRO-56	Pacolet River	At N. and S. Pacolet R. Confluence	--	C,D	E,F,G	E,F,G	E,F,G	1971		
CATAWBA-WATEREE RIVER BASIN										
CW-2	Waterree R.	Near Eastover	A,B	C,D	E,F,G	E,F,G	E,F,G	1970		
CW-6	Waterree R.	Near Liberty Hill	--	C,D	E,F,G	E,F,G	E,F,G	1971		

*A - Includes coliform, dissolved oxygen, flow, nitrogen (total), pH, phosphorus (total) and specific conductance to be sampled monthly from May to October.
 B - Includes "A" plus alkalinity, BOD, chlorine, chromium, color, copper, dissolved solids, fluoride, hardness, iron, lead, manganese, nickel, pesticides, radiation, sulfate, turbidity and zinc to be sampled annually during the winter.

C - Includes "A" plus approximately 4 additional parameters.

E - Includes "A" plus approximately 7 additional parameters.

G - Biological analysis to be sampled annually.

D - Includes "B" plus approx. 6 additional parameters.

F - Includes "B" plus approx. 11 additional parameters.

